CONSEIL PERMANENT INTERNATIONAL POUR
L'EXPLORATION DE LA MER

RAPPORTS
ET
PROCÈS-VERBAUX DES RÉUNIONS

VOLUME LXXIV

PROCÈS-VERBAUX

(MARS — 1931)

EN COMMISSION CHEZ
ANDR. FRED. HØST & FILS
COPENHAGUE

Prix: Kr. 7.75.

800. IX. 31. Septembre 1931.

COPENHAGUE — IMPRIMERIE BIANCO LUNO A/S

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VINGT-QUATRIÈME RÉUNION

COPENHAGUE — MARS 1931

BUREAU DU CONSEIL:

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M. Otto Pettersson, Vice-Président du Conseil.
M. J. Hjort, Vice-Président du Conseil.
M. Théodore Tissier, Vice-Président du Conseil.
M. C. Heinrici, Vice-Président du Conseil.

MEMBRES DU CONSEIL ET EXPERTS

et leurs adresses:

Allemagne: M. le Dr. C. Heinrici, Secrétaire d'Etat à disposition, Président de la Commission scientifique allemande pour l'Exploration de la Mer, Potsdamerstrasse 22a, *Berlin, W. 9.*

M. le Professeur W. Mielck, Directeur de la Station Biologique de *Helgoland.*

Experts: M. le Professeur E. Ehrenbaum, Kirchenallee 47, *Hamburg 5.*
M. le Professeur G. Schott, Deutsche Seewarte, *Hamburg 3.*
M. le Dr. H. Lübbert, Membre du "Reichswirtschaftsrat", Docent à l'Université, *Hamburg 36.*
M. le Dr. E. Fischer, Potsdamerstr. 22a, *Berlin W. 9.*
M. le Professeur A. Defant, Georgenstr. 34/36, *Berlin, N.W. 7.*
M. le Professeur B. Schulz, Deutsche Seewarte, *Hamburg 3.*
M. le Professeur A. Willer, *Königsberg.*
M. le Professeur A. Wulff, Staatl. Biol. Anstalt, *Helgoland.*
M. le Dr. A. Bückmann, Staatl. Biol. Anstalt, *Helgoland.*
M. le Dr. W. Schnakenbeck, Kirchenallee 47, *Hamburg 5.*

Belgique: M. G. Gilson, Professeur, Laboratoire maritime, Ostende-Phare, *Ostende.*
*M. H. Baels, Ministre de l'Agriculture, Administrateur de sociétés de pêche, Membre de la chambre des Représentants, Echevin de l'industrie et du commerce, Avenue Serruys 64, *Ostende.*

* Empêché d'assister à la réunion.

Danemark: M. le Dr. Martin Knudsen, Professeur à l'Université, Ecole Polytechnique, *Copenhague.*

M. le Dr. Johs. Schmidt, Professeur, Directeur du Laboratoire Carlsberg, Section de Physiologie, Valby, *Copenhague.*

Experts: *M. F. V. Mortensen, Directeur des Pêches, Kristiansgade 6, *Copenhague.*

M. A. Strubberg, Direction des Pêches, Kristiansgade 6, *Copenhague.*

*M. le Dr. A. C. Johansen, Directeur de la Station biologique danoise, Strandvej 34 B, *Copenhague.*

M. le Dr. H. Blegvad, Station biologique danoise, Strandvej 34 B, *Copenhague.*

M. le Dr. Erik M. Poulsen, Strandvej 34 B, *Copenhague.*

M. Aage J. C. Jensen, Strandvej 34 B, *Copenhague.*

M. le Dr. Å. V. Tåning, Laboratoire Carlsberg, Section de Physiologie, Valby, *Copenhague.*

M. Anton Fr. Bruun, Laboratoire Carlsberg, Section de Physiologie, Valby, *Copenhague.*

M. le Dr. P. Jespersen, Strandvej 34 B, *Copenhague.*

Espagne: M. le Professeur Odón de Buen, Directeur Général de l'Institut espagnol d'Océanographie, Professeur de Biologie à l'Université de Madrid, Président du Conseil d'Océanographie Ibéro-Américain, Alcalá 31, *Madrid.*

M. le Professeur Rafael de Buen, Secrétaire de la Délégation espagnole, Sousdirecteur de l'Institut espagnol d'Océanographie, Secrétaire Général du Conseil d'Océanographie Ibéro-Américain, Alcalá 31, *Madrid.*

Experts: *M. l'Amiral Léon Herrero, Directeur de l'Institut et Observatoire de la Marine, *San Fernando* (*Cadix*).

M. l'Ingénieur en Chef José Galbis, Chef des Services Géodésiques dans l'Institut Géographique et Cadastral, *Madrid.*

*M. l'Ingénieur en Chef Manuel Aulló, Directeur du Laboratoire de la Faune forestière espagnole, Pisciculture et Ornithologie, Ferraz 40, *Madrid.*

Finlande: M. le Dr. R. Witting, Professeur, Directeur de l'Institut pour l'Exploration de la Mer, *Helsingfors.*

M. le Dr. T. H. Järvi, Professeur, Directeur de l'Institut scientifique des Pêches, *Helsingfors.*

* Empêché d'assister à la réunion.

France: M. Théodore Tissier, Vice-Président du Conseil d'Etat, Président du Conseil d'Administration de l'Office Scientifique et Technique des Pêches Maritimes, Vice-Président du Conseil International, 13, rue Monsieur, *Paris.*

M. le Dr. Ed. le Danois, Directeur de l'Office Scientifique et Technique des Pêches Maritimes, Secrétaire Général de la Commission de la Méditerranée, 3, avenue Octave Gréard, *Paris*, suppléant *M. G. Lecourbe, Directeur des Pêches Maritimes au Ministère de la Marine Marchande, 24, rue du Boccador, *Paris.*

Experts: M. L. Ruffat, Chef de Bureau au Ministère des Colonies, *Paris.*

M. Terrin, Sous-Chef de Bureau au Ministère de la Marine Marchande. Adjoint au Directeur du Service des Pêches maritimes, *Paris.*

*M. Fage, Sous-Directeur de Laboratoire du Muséum d'histoire naturelle, *Paris.*

M. G. Belloc, Chef du Laboratoire de l'Office des Pêches à *La Rochelle.*

M. Jean le Gall, Professeur Agrégé de l'Université, Chef du Laboratoire de l'Office des Pêches à *Boulogne s/ Mer.*

Grande Bretagne: Mr. Henry G. Maurice, C. B., Fisheries Secretary, 43, Parliament Street, *London.*

Professor D'Arcy W. Thompson, C. B., F. R. S., The University, *St. Andrews.*

Experts: Dr. E. S. Russell, O. B. E., Director of Fishery Investigations, 43, Parliament Street, *London, S. W. 1.*

*Mr. J. O. Borley, O. B. E., "Discovery Committee", Colonial Office, Queen Anne's Chambers, Dean Farrar Street, *London S. W. 1.*

Dr. A. Bowman, F. R. S. E., Scientific Superintendent, Fishery Board Laboratory, *Aberdeen.*

Mr. F. M. Davis, Fisheries Laboratory, *Lowestoft.*

Mr. J. R. Lumby, Fisheries Laboratory, *Lowestoft.*

Mr. C. F. Hickling, Fisheries Laboratory, *Lowestoft.*

Mr. D. J. Matthews, Hydrographic Department, Admiralty, Whitehall, *London, S. W. 1.*

Mr. H. Wood, M. A., Fishery Board Laboratory, *Aberdeen.*

Mr. W. J. M. Menzies, Fishery Board for Scotland, *Edinburgh.*

* Empêché d'assister à la réunion.

État Libre d'Irlande: *Mr. Charles Green, Inspector of Fisheries, 3, Kildare Place, *Dublin.*
Mr. G. P. Farran, Inspector of Fisheries, 3, Kildare Place, *Dublin.*
Expert: Mr. R. Southern, Assistant Inspector of Fisheries, 3, Kildare Place, *Dublin.*

Italie: *M. le Professeur G. Magrini, *Stra* (Venise).
*S. E. l'Amiral Paolo Thaon di Revel, *Rome.*

Lettonie: *M. V. Miezis, Ministère d'Agriculture, *Riga.*

Norvège: M. le Professeur Johan Hjort, à l'Université, *Oslo.*
*M. S. K. Asserson, Directeur des Pêches, *Bergen.*
Experts: M. Oscar Sund, Laboratoire du Dir. des Pêches, *Bergen.*
M. le Dr. Sven Runnstrøm, Laboratoire du Dir. des Pêches, *Bergen.*

Pays-Bas: M. le Dr. J. J. Tesch, Chef de la Section "Pêche maritime" de l'Institution Gouvernementale pour l'Examen Biologique des Poissons, Heerengracht 2, *'s Gravenhage.*
M. P. M. van Riel, Directeur-adjoint, Chef de la Section d'Océanographie et de Météorologie Maritime de l'Institut Météorologique Royal des Pays-Bas, *De Bilt.*

Pologne: M. Michel Siedlecki, Professeur de Zoologie à l'Université de Cracovie, 6, St. Anne, *Cracovie.*
M. Joseph Borowik, Directeur de l'Institut Baltique, Ecole Marine, *Gdynia.*

Portugal: **M. le Contre-Amiral Augusto Ramos da Costa, Direction d'Hydrographie, Ministère de la Marine, *Lisbonne.*

Suède: M. le Dr. O. Pettersson, Professeur, Kungstorget 7, *Göteborg.*
M. le Dr. K. A. Andersson, Directeur des Pêches Maritimes, Kungl. Lantbruksstyrelsen, *Stockholm.*
Experts: M. le Dr. Arvid R. Molander, *Lysekil.*
M. le Dr. Nils Rosén, Intendant de Pêcheries, District de l'Ouest, *Göteborg.*
M. N. O. Zeilon, Professeur à l'Université, *Lund.*
M. B. Otterstedt, *Bornö.*

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* Empêché d'assister à la réunion.

** Empêché d'assister à la réunion. Depuis la date de la Réunion du Conseil M. le Contre-Amiral Ramos da Costa a retiré, ayant atteint la limite d'âge pour le service officiel. On est prié d'adresser toute communication, destinée au Délégués Portugais, à M. le Commandant Marcelino Carlos, Directeur des Pêcheries, Ministère de la Marine, Lisbonne.

Invités pour prendre part aux Réunions spéciales scientifiques:

M. V. Walfrid Ekman, Professeur à l'Université, *Lund*, *Suède.*

M. le Professeur G. I. Taylor, F. R. S., Trinity College, *Cambridge*, *Grande Bretagne.*

M. le Dr. H. Thorade, Börnestr. 33, *Hamburg 23*, *Allemagne.*

M. Aug. Krogh, Professeur à l'Université, Directeur du Laboratoire de Zoophysiologie, Juliane Mariesvej 34, *Copenhague*, *Danemark.*

M. R. Spärck, Dr. phil., Muséum de Zoologie, Krystalgade, *Copenhague*, *Danemark.*

M. H. H. Gran, Professeur à l'Université, *Oslo*, *Norvège.*

M. le Dr. Kurt Buch, Chef de la Section chimique de l'Institut pour l'Exploration de la Mer, *Helsingfors.*

M. le Dr. H. Wattenberg, Ungererstr. 70, *München*, *Allemagne.*

M. H. W. Harvey, The Laboratory, Citadel Hill, *Plymouth*, *Grande Bretagne.*

Invités: *M. le Prof. A. G. Huntsman, at the Atlantic Biological Station, *St. Andrews*, *N. B.*, *Canada.*

M. le Dr. Henry B. Bigelow, at the Wood's Hole Oceanographic Institution, *Wood's Hole*, *Massachusetts*, *U. S. A.*

* Empêché d'assister à la réunion.

AGENDA

for the twentyfourth Meeting of the International Council for the Exploration of the Sea.

1. Opening of the Proceedings by the President.
2. Report as to the present participation and to the adherence for a further period of five years.
3. Administrative Report.
4. Final Approval of the Accounts for 1929—1930.
5. Approximate Statement of Accounts for 1930—1931.
6. Arrangements for Scientific Meetings and adjustments, if any, of the circulated programmes of proceedings.
7. Consideration of Reports and Programmes of the Committees (including Reports of extraordinary Committee meetings during the year).
8. Prof. Odón de Buen's proposal regarding biennial meetings.
9. Intercourse with other Institutions.
10. Estimates for the financial year 1931—1932.
11. Nomination of the members of the Bureau, and the Finance Committee, and the Editorial Committee, and of the Editors, etc.
12. Time and place for the next Council Meeting.
13. Other business.
14. Conclusion of the Meeting.

REPORT

of

the twentyfourth Meeting of the Council.

First Sitting: Monday, March 23rd, at 11,00 a. m.

The President, Mr. MAURICE, in the chair.
Present: The members and experts (vide list pp. 5—9).

Under **Point 1 of the Agenda** the President formally opened the proceedings in the following words:—

Messieurs les Délégués et Experts.

J'ai l'honneur de déclarer ouverte la 24ième session du Conseil International.

Avant de passer à l'ordre du jour, saluons, Messieurs, la mémoire de nos morts.

Qui de nous n'a connu OSTENFELD? Tous ceux qui ont été en rapport avec notre Conseil le considéraient comme un de ceux auxquels cette assemblé internationale doit sa renommée. Ses énormes travaux sur le plankton lui avaient conféré en cette matière une autorité indiscutable et indiscutée. Sa réputation scientifique s'étendait du reste au monde entier. Le Comité du Plancton perd en lui un président presque irremplaçable par suite de sa haute technologie. Mais nous nous demandons si nous ne devons pas regretter l'homme au moins autant que le savant: droit, calme, bienveillant, sensé, tel était OSTENFELD: c'était un ami sûr, un collègue excellent. Que notre grande douleur s'unisse à celle de ceux qu'il laisse: nous adressons à sa famille, à sa patrie l'expression de notre sympathie attristée. Je vous demande, Dr. SCHMIDT et Dr. KNUDSEN d'en être les interprètes.

Professor KNUDSEN spoke as follows:—

On behalf of the Danish Delegation I beg to thank you very much for the kind words. Since 1894 OSTENFELD has been active as a Planktologist, but he was also very eminent in other branches, as a matter of fact he was the highest authority in the Danish flora who had ever lived in Denmark. We miss him very much and thank you most cordially for the words you have spoken in respect of his memory.

The President resumed:—

Le 7 janvier mourait à Kiel le Professeur KARL BRANDT, le grand biologiste allemand, dont les travaux sur la composition du plancton et le métabolisme marin appartiennent à la Science mondiale et ont absolument créé une nouvelle branche de recherches. Membre de la Commission allemande et de la Commission prussienne des recherches marines, le Professeur BRANDT peut être considéré comme un des fondateurs du Conseil International. Il prit part en effet aux réunions de Stockholm en 1899, et aux séances de Copenhague en 1903. Plus récemment, en 1927 et en 1928, ce grand savant apportait

à nos délibérations l'appui de sa haute autorité scientifique. Au nom du Conseil, je prie M. le Dr. HEINRICI d'assurer son gouvernement de notre profonde condoléance.

Dr. HEINRICI spoke as follows:—

Namens der Deutschen Regierung spreche ich dem Herrn Präsidenten für die Worte des Andenkens und der Anerkennung, die er dem verstorbenen Herrn Geheimrat BRANDT gewidmet hat, den besten Dank aus. Geheimrat BRANDTS Mitarbeit an der Internationalen Meeresforschung galt weniger den unmittelbar praktischen Fragen. Seine Forschernatur wies ihn auf die grundlegenden Probleme, Arbeiten die in besonderem Masse kritischen Blick, Ausdauer und Selbstbescheidung erfordern. Diese Eigenschaften verband er mit einer liebenswerten Persönlichkeit. Er ging still zwischen uns, aber die Spuren seiner erfolgreichen Arbeit haben wir überall gespürt. Die Erinnerung an ihn und an sein Werk wird bei uns, seinen deutschen Kollegen und, wie ich mit Dank den Worten des Herrn Präsidenten entnehme, auch in dem weiteren uns hier vereinigenden Kreise lebendig bleiben.

The President resumed:—

Il y a quelques semaines seulement que mon cher ami et collègue DAVID JONES mourait à Edinburgh. Peu de jours auparavant je l'avais rencontré à Londres; il était, comme toujours, gai, animé, spirituel. JONES était en effet de ces hommes chez qui les hautes qualités de travail et d'intelligence n'altèrent pas la bonne humeur et la joie de vivre. Cette extrême vitalité se répandait autour de JONES à tel point qu'il reportait sur ses amis toutes ses qualités de cœur, possédant ainsi le véritable génie de l'amitié. Il y avait si longtemps que notre ami siégeait au Conseil, soit comme expert, soit comme délégué, que sa disparition semble creuser un vide éternel dans nos rangs. Il ne m'appartient pas de retracer ici la carrière brillante de DAVID JONES: je suis assuré que le Professeur D'ARCY THOMPSON tiendra lui-même à remplir ce pieux devoir; c'est à lui, son collègue au service des Pêcheries d'Ecosse que je demande de recevoir l'expression de l'hommage que nous rendons à la mémoire de notre collègue disparu.

Professor D'ARCY W. THOMPSON said:—

Mr. President, before I add my word of tribute to the memory of DAVID JONES, let me also praise and commemorate the other illustrious men whose death, with his, has cast a shadow over us.

When an older generation was laying the foundations of all our work of today, CLEVE, HENSEN and BRANDT established the science of Plankton. We older men look back on all three as trusted friends, and as colleagues of exceptional scientific distinction.

Professor BRANDT died, even as HENSEN had died, after his life's work was done, in the fulness of his years. But Professor OSTENFELD passed away with industry undiminished, with vigour unabated, and before more than the rich first fruits of his great harvest were gathered in. His notable contribution to our Plankton-work was but a small part of his multifarious labours. In all parts of the world (I have been with him in many) his industry never flagged, his love of plants was never satisfied; the countless things which he saw and gathered every day were kept in his orderly and tenacious memory till his erudition became like that of the famous botanists of old, even of the great LINNAEUS.

Of DAVID JONES what more need I say, after your own affectionate words? His qualities and services were not the same as those of the other two distinguished men; but none the less do we bear witness to his useful and abundant work, and pay tribute to his high and excellent qualities. You have called him a dear friend, and that is precisely what he was to many here and everywhere. He had the golden gift of friendship; and many here who knew him less long and intimately than you or I, had learned to welcome him as the cheerfullest of companions, and mourn him as one of the most lovable of friends.

The President resumed:—

En l'honneur de tous ces collègues disparus je vous demande, Messieurs, de vous recueillir en silence.

After an interval of silence the President resumed:—

Messieurs les Experts qui siégez à ce Conseil pour la première fois, en mon nom personnel et en celui de tous mes collègues, je vous souhaite la plus cordiale bienvenue.

Je m'attendais à avoir aujourd'hui parmi nous, venus de l'autre côté de l'Atlantique, les deux savants américains bien connus, les Drs. BIGELOW et HUNTSMAN. Malheureusement le Dr. HUNTSMAN a été retenu en Canada et le Dr. BIGELOW ne se joindra à nous que demain, ayant été retardé dans son voyage par une traversée difficile. Il représentera aux séances du Conseil le Conseil des Pêcheries de l'Amerique du Nord, dont il est Président. Vous pourrez voir par la lecture du résumé des travaux de ce Conseil qu'il a bien voulu nous envoyer, que ses buts sont en pleine conformité avec ceux poursuivis par notre Conseil.

Aussi est il logique d'envisager un rapprochement plus intime entre les deux organisations internationales. Le Dr. BIGELOW est assuré de trouver parmi nous le plus profond désir de collaboration avec le Conseil qu'il préside si heureusement.

Enfin, Messieurs, je salue en votre nom un de nos collègues qui depuis longtemps avait manqué à nos séances et que nous voyons avec grand plaisir revenu siéger parmi nous après un voyage dont le souvenir restera dans les annales scientifiques. Mon cher Dr. JOHS. SCHMIDT, j'ai eu le grand plaisir de vous saluer à Plymouth au nom du Conseil International et du Gouvernement de la Grande Bretagne à la fin de votre fameux voyage autour du monde sur votre navire de recherches le "Dana". Je ne veux pas parler ici du résultat de vos travaux, je suis sûr qu'il est des plus remarquables et que vos collègues sauront l'apprécier, mais je tiens à vous féliciter ici en vous renouvelant l'expression de notre affectueuse bienvenue.

Professor SCHMIDT spoke as follows:—

May I thank you very much for the kind words you have expressed on the occasion of the "Dana" expedition. During my long voyage I was extremely pleased to receive on two occasions telegrams from the Council which gave me the assurance that we were not forgotten, and I felt it as a very great honour when I arrived at Plymouth with the "Dana" that the President of the Council welcomed us there.

The President resumed:—

J'exprime de même tout le plaisir que nous avons à retrouver parmi nous après son long voyage aux Indes Néerlandaises notre collègue le Directeur VAN RIEL.

Mr. VAN RIEL said:—

Mr. President, I thank you very much for the kind words.

The President resumed:—

Je vous propose d'adresser, selon notre coutume par télégramme nos hommages d'affectueux respect à Sa Majesté le Roi de Danemark.

Enfin me chargerai-je de remercier en votre nom le comte REVENTLOW pour les mesures que le Gouvernement du Roi a bien voulu prendre pour nous recevoir ici à Christiansborg.

Point 2 of the Agenda. Report as to the present Participation.

The President reported that all countries with the exception of Italy had indicated their intention to continue to adhere to the Council. He read a letter addressed to him from Professor MAGRINI in the name of himself and His Excellency Admiral THAON DI REVEL expressing their regrets that they had been obliged to give up the idea of attending the meeting because the Italian Government had not yet come to a decision regarding the adhesion of Italy to the Council for the next quinquennium.

The President referred also to a letter received at the Danish Foreign Office from the Danish Ambassy of Rome intimating that no definite reply was to be expected before the end of June that is to say until after the approval of the Italian Budget.

Point 3 of the Agenda. Administrative Report.

As the Administrative Report had only just been circulated the President proposed that an opportunity for comment upon it should be given at the final Council Meeting.

Point 4 of the Agenda. Final Approval of the Accounts for 1929—30.

The President stated that the accounts had been found correct by the Finance Committee. If anyone wanted to examine the accounts, this could be done in the office. These accounts would be submitted for final approval at the final Council Meeting.

Point 5 of the Agenda. Approximate Statement of Accounts for 1930—31.

The President observed that the Statement of Accounts could necessarily only be approximate because the financial year was not yet ended. He suggested that further consideration should be deferred until they had been finally ended and examined by the Finance Committee.

Point 6 of the Agenda. Arrangements for Scientific Meetings and adjustments, if any, of the circulated Programme of Proceedings.

The President announced that in order to meet convenience of certain members of the Council for whom it was important that they should leave Copenhagen early on Sunday morning he had with the assistance of Professor HJORT and Dr. LE DANOIS readjusted the programme of proceedings which had been circulated. He proposed that the detailed programme of meetings of Committees etc. should be settled by the Consultative Committee. This course was agreed to.

Point 9 of the Agenda. Intercourse with other Institutions.

The President informed the Council that the Bureau had invited Dr. HUNTSMAN from Canada and Dr. BIGELOW of the Oceanographical Institute at Wood's Hole to attend the meeting as visitors with the view of discussing arrangements for co-operation between the Council and the North American Council on Fisheries Investigations and other insti-

tutions for marine research on the western side of the Atlantic. Dr. HUNTSMAN, who had intended to come, had been unfortunately detained in Canada by urgent affairs. Dr. BIGELOW was on his way and would have arrived in time for the meeting, but he had been delayed first by storm and later by fog. He was satisfied that Dr. BIGELOW would receive a warm welcome from the Council when he arrived, and that his visit would prove useful both to the Council and to those workers on the other side of the Atlantic for whom Dr. BIGELOW could speak.

It was agreed that **Point 8 of the Agenda** should be discussed at a meeting of the Council without Experts, and that all other points should be postponed to the final sitting of the Council.

The meeting adjourned.

Second Sitting: Tuesday, March 24th, at 5 p. m.

The President, Mr. MAURICE, in the chair.
Present: The members of the Council.

The President stated that this meeting was summoned in order to discuss Prof. ODÓN DE BUEN'S proposal that the Council should hold biennial meetings instead of annual ones and referred to the Memorandum (see Appendix p. 24) drawn up by the Bureau in which they endeavour to state all the advantages and disadvantages of a change from annual to biennial meetings. He further informed the Delegates that the Members of the Bureau had discussed the question on several occasions with a view to forming an opinion. Yesterday they had drawn up the following proposal which had been circulated:—

> The Bureau considers that the principle of yearly sessions should be maintained.
>
> But it considers it desirable that arrangements should be made so that in alternate years the length of the annual session should be shorter and that the number of participants at these shorter sessions should be reduced so that in these two ways the expenses of the States adhering may be reduced.
>
> The Bureau asks the Council to authorise them to undertake a thorough examination of the question.

Professeur O. DE BUEN dit:

Je ne crois pas nécessaire de donner une exposition détaillée de ma proposition. Notre Président a eu l'amabilité de rédiger un mémorandum très clair et très exact.

Etant donné qu'on nous présente, sous forme de proposition, une formule adoptée, à l'unanimité par les membres du Bureau, je l'accepte ayant grande confiance sur le résultat des études dont le Bureau doit régler les détails d'après les pouvoirs qu'on lui a accordé.

C'est sans doute le Bureau qui peut le mieux mesurer l'importance de cette décision, en tenant compte des traditions du Conseil; il est possible qu'il existe des raisons d'ordre moral et des détails d'un intérêt certain que nous pouvons difficilement apprécier.

Dr. TESCH asked the President how the Bureau intended to arrange to make the sessions shorter and less frequented; he hoped that all Committees would meet every year.

The President said that Dr. TESCH asked him to anticipate the instructions the Bureau asked the Council to suggest. The Bureau had no fixed idea, there were many details to discuss.

Professor D'ARCY THOMPSON thought it much easier to leave the matter in the hands of the Bureau. For his part he would greatly regret if this proposal should be adopted, and he pointed out that it was of the utmost importance for the young scientists to have the opportunity of meeting their colleagues; he had never felt that the meetings were too much frequented, neither did he think that the travelling expenses involved were too heavy for the participating countries.

The President said that he agreed in general with Professor D'ARCY THOMPSON, but pointed out that Professor O. DE BUEN's difficulties arose of the much more expensive journey which enabled him to bring only one expert to the meeting, and of course it was not possible for the two Spanish delegates and one expert to attend all Committee meetings. He would be pleased to receive suggestions and suggested that possibly special Committees might meet between the meetings at more convenient places.

Dr. K. A. ANDERSSON said that he had considered carefully the Memorandum and felt convinced that it would be best to continue having annual meetings as hitherto, as this procedure compelled the Committees to work more intensively.

Professor M. SIEDLECKI said that before coming he had asked for his Government's opinion, and they preferred to continue as hitherto with annual meetings. Especially for the Baltic the work needed control every year. There were now various agreements between the countries bordering the Baltic, and the question of new measures with regard to the Salmon fishery had just been discussed in the Limnological Committee.

Monsieur THÉODORE TISSIER dit que le Bureau avait cherché à satisfaire l'Espagne et que maintenant la situation est renversée; l'Espagne est satisfaite, mais les autres pays formulent des objections contre la solution transactionelle proposée. Il ajoute que le Bureau n'avait pas voulu précipiter la décision, mais avait voulu réflechir.

Professor JOHS. SCHMIDT said that the question had been discussed in the Danish Commission where they had arrived at the conclusion that they were very satisfied with the previous arrangement. They had further agreed that in case of vote they would vote against a change in the present condition.

The President hoped that there would be no question of a vote. The majority would regret a change, but wished to accomodate the distant countries. He suggested that the Bureau should try to bring up a proposal for discussion by the Council at the next year's meeting.

Professor D'ARCY THOMPSON said that he would prefer that it should not even be suggested that such steps should be taken.

The President then asked Professor O. DE BUEN whether he was willing to withdraw his proposal, and

Professeur O. DE BUEN dit qu'il est d'accord avec le Bureau, et content de laisser la question au Bureau.

M. Théodore Tissier dit que même en maintenant le *statu quo*, il y a un moyen de réduire les dépenses de voyages pour les pays lointains. Il est d'usage que le Conseil se réunisse en dehors de Copenhague toutes les 3 années. En principe le Conseil peut donc se réunir toutes les 3 années dans une ville plus centrale.

It was resolved to leave the question in the hands of the Bureau.

The President raised the question of the Budget which gave rise to certain difficulties. For some time large sums had been drawn from the reserve, and it was now doubtful whether Italy would continue her adhesion. The Bureau was anxious not to exceed the revenue and asked all Delegates to be as economical as possible in their recommendations in the various Committees.

Third Sitting: Saturday, March 28th, at 5 p. m.

The President, Mr. Maurice, in the chair.
Present: The members and experts (vide list pp. 5—9).

The President opened the meeting and stated that in accordance with the decision of the first sitting of the Council the following telegram had been sent to his Majesty the King of Denmark:—

»A sa Majesté le Roi de Danemark.

Les Membres du Conseil International pour l'Exploration de la Mer réunis à Copenhague demandent la permission de témoigner à Votre Majesté leurs sentiments les plus respectueux.

Maurice, Président,
Copenhague.«

in reply to which the following telegram had been received from the King:—

»Mes remerciements sincères.

Christian R.«

The President further read the following letter from Mr. Miezis:—

»J'ai l'honneur de vous informer, que, à cause des obligations de service, je suis empêché d'assister à cette réunion du Conseil International.

Veuillez agréer, Monsieur, l'assurance de ma plus haute considération.

V. Miezis,
Délégué de Lettonie.«

and informed the members that he had received a letter from Dr. Ramalho informing him that Dr. Ramalho would, at any rate for the present, no longer represent Portugal on the Council. He felt sure that all members would greatly regret this and would authorise him to write to Dr. Ramalho to express the regrets of the Council. This suggestion was carried by applause. The President stated that he had understood that

Portugal would be represented on the Council this year by Admiral Ramos da Costa; the Council would regret that no representative of Portugal had taken part in its proceedings on this occasion.

The President said that he felt certain that it would be the unanimous wish of the Council to send a message to Dr. Johansen expressing regrets for his absence and especially for the circumstances which caused it, and expressing the best wishes of the Council for his speedy and complete recovery. He proposed that a telegram to this effect should be sent to Dr. Johansen, and this proposal was approved by acclamation[1]).

Point 3 of the Agenda. Administrative Report.

No observations having been received on the report it was adopted without amendment.

Point 4 of the Agenda. Final approval of the accounts for 1929—30.

The accounts were finally approved.

Point 5 of the Agenda. Statement of Accounts for 1930—31.

The President reminded the Council that on account of the early meeting a complete statement of accounts could not yet be given, but the final accounts would be printed in the Procès-Verbaux and be laid before the Council for approval at its next meeting. The accounts would include, as a charge on the finances of the current year, the expenses of the special Experts attending the Scientific Meetings just held and a final subvention of 2.500 Kr. to Professor Gilson who had declined such a subvention at the last meeting, but, having encountered unexpected difficulties, had requested that the question might be reconsidered. The Bureau having discussed the matter with Professor Gilson, and having learned that Belgium had now made arrangements to contribute 10.000 Kr. annually to the expenses of the Council as in the past, had agreed to recommend this subvention on the clear understanding that no further assistance of this kind would be asked for or accorded.

Point 7 of the Agenda. Consideration of Reports and Programmes of the Committees (including Reports of extraordinary Committee meetings during the year).

Consultative Committee. All Regional and Scientific Committee Reports had been treated in the Consultative Committee with one exception. They had all been considered by the Bureau and adopted by them with certain amendments which Professor Hjort had accepted on behalf of the Consultative Committee.

With regard to point 6, par. 2, of the Recommendations of the Consultative Committee the President said that the Bureau wished to make it clear that the question of the continued existence of the Limnological Committee was not finally decided. If the Committee was kept in being it would for the future be known as the "Salmon and

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[1]) A telegram was sent in the following terms:—

"The International Council for the Exploration of the Sea at their final meeting charged me to express their deep regrets at your absence and the circumstances which prevented your being present and their best wishes for your speedy restoration to complete health.

Please accept at the same time my personal regret and my warmest good wishes.

Maurice, President."

Trout Committee". The Bureau suggested that the question should be decided in the light of the memorandum which the Chairman was invited to prepare and for which it was proposed that the sum of 1000 Kr. should be paid to him. He asked the Chairman, Professor M. SIEDLECKI, whether he was satisfied with this recommendation.

Professor SIEDLECKI said that he was prepared to accept it and hoped with the aid of the Committee to arrive at a conclusion which would be acceptable to the Council.

It was agreed that a sum of 1000 Kr. should be paid to the Chairman of the Limnological Committee for the preparation of the programme of work, and that a sum of 3000 Kr. should be paid to Professor HENKING for his second report on the Salmonidae.

The Atlantic Slope Committee had recommended that a meeting of 3 experts for the consideration of ichthyometrical methods for the study of the tunny should be held in Spain before the next meeting of the Council.

Dr. LE DANOIS ajoute qu'il serait heureux que M. le Professeur ODÓN DE BUEN, qui n'a pas pris part à la réunion du Comité du Plateau Continental Atlantique, veuille donner son opinion sur cette question.

Professeur ODÓN DE BUEN répond qu'il serait très content de réunir le Comité à Seville, mais qu'il importe de connaître l'époque de la réunion.

The President thanked Professor ODÓN DE BUEN and suggested that this question should be arranged between Professor ODÓN DE BUEN and Dr. LE DANOIS.

It was agreed to vote 2500 Kr. for this meeting.

The Baltic Committee intended to publish an area report, and this would involve the addition of 2.500 Kr. to the vote for printing and distribution.

The Hydrographic Committee had strongly recommended the preparation of Isotherm charts of the North Sea and the English Channel, for which a sum of 500 Kr. was necessary; this was adopted. They further asked that the 1500 Kr. voted last year for the printing of density tables prepared by Mr. MATTHEWS might be carried on to the new Budget. The sum was revoted and will be included in the vote for printing and distribution.

The Committee had further recommended investigations to be made on the submarine waves in the Kattegat and in the Belts for which they asked for a sum of 3.500 Kr. The President explained that the Bureau felt a certain amount of difficulty with regard to this question. The conditions were rather peculiar and appeared to controvert the usual practise of the Council which was not to pay contributions to the expenses of work to be carried out by the participating countries. It had been explained to them that the intention was that the material collected by the ships engaged in these investigations should be handed over for treatment to certain Institutions not yet definitely selected. The Bureau had ultimately decided to recommend to the Council that a sum of 3.500 Kr. should be placed at the disposal of the Bureau who would thus be in a position to deal with requests as they were received from the Institutions selected for carrying out this work. This proposal was adopted.

The Plankton Committee had recommended that the sum of 400 Kr. left over from the vote of last year for experiments with Plankton nets should be carried on to

the new budget. This was agreed to. It was also agreed that an honorarium of 1000 Kr. should be paid to Professor GRAN for the preparation of a memorandum on the future work of the Plankton Committee (Recommendation 6, par. 3, of the Consultative Committee).

The Statistical Committee, on the recommendation of the special Herring Committee at its meeting in Lowestoft (see the report of this Committee pp. 116—22), proposed to include in the next Statistical Bulletin certain special information regarding the distribution of herring. This would involve some increase of the cost of the Statistical Bulletin which it was difficult to estimate for the moment, but which it was thought would not amount to more than 1000 Kr. The proposal was agreed to.

The report of the Combined North Sea Committee had come in too late to be considered by the Consultative Committee. It had been suggested that the Committee should be renamed the "Combined North Sea and Eastern Channel Committee". The Committee had suggested that further meetings of the special Herring Committee and the special Sardine Committee should be held this year, but, having regard to the financial position, the Bureau suggested that the question should be reserved for reconsideration at the next meeting of the Council.

The Council having approved the financial recommendations as set out above adopted all the reports of the Committees *en bloc* in the form in which they are printed herewith (pp. 36—101).

The President drew attention to the fact that Professor SIEDLECKI had been elected Chairman of the Salmon and Trout Committee, Professor GILSON of the Combined North Sea Committee and Professor GRAN of the Plankton Committee for this year, and that all other Chairmen and Vice-Chairmen had been re-elected.

Editorial Committee. The proposals of this Committee were adopted. With regard to the question of a pamphlet on fish marks prepared by Dr. RUSSELL, the President explained that the object was to make the fish marks more widely known and to secure a greater number of returns; the pamphlets were to be distributed to all countries. It had been suggested that the pamphlet should be distributed to the fishermen directly, but that would involve translation into many languages at great cost, and it seemed preferable to invite the Governments of each country to convey the necessary information to its fishermen.

Dr. LE DANOIS fait remarquer que malheureusement il n'a pu assister à la séance du Comité quand se discutait la question. La meilleure solution serait l'affichage à bord des bateaux de placards rédigés en plusieurs langues.

Professor D'ARCY THOMPSON suggested that the pamphlet should be sent to the Fishery Departments of each country; the Delegates might or might not be in touch with the fishermen.

It was agreed to print the pamphlet and to send it to the Fishery Departments as well as to the Delegates.

Point 9 of the Agenda. Intercourse with other Institutions.

The President referred to the observations he had made at the opening meeting with regard to the visit of Dr. BIGELOW. He wished to take the opportunity of his being

actually present to express to him the satisfaction which his visit had caused to the Council. Dr. BIGELOW had now had time to acquaint himself with the work of the Council. He had attended many Committee meetings and had so impressed his personality on the members and experts that the Consultative Committee had passed a recommendation which seemed to the Bureau to be so important that it ought to be specially treated. In effect it contained a standing invitation to the representatives of the Wood's Hole Institute and the North American Council on Fisheries Investigations and he might add to Dr. BIGELOW personally, whatever his future might be, to attend all meetings of the Council. The Council hoped in future to have many opportunities to consult them, to learn from them and to link up its own investigations with the work done on the western side of the Atlantic.

Dr. BIGELOW expressed his thanks for the welcome he had received and the friendly way in which he had been treated. As far as possible he would most gladly accept the invitation, and he added that he considered the time ripe for closer co-operation.

The Council thereupon formally passed the following resolution based on recommendation 5 of the Consultative Committee:—

> The Council has heard with great interest the account given by Dr. H. B. BIGELOW, Director of Wood's Hole Oceanographical Institute, of his plans for the investigation of the North Atlantic, particularly in its western part. It welcomes this important new development, and considers the moment opportune to enter into close co-operation both with the Wood's Hole Oceanographical Institute and with the North American Council on Fisheries Investigations, believing that such co-operation will be fertile in results. It is of opinion that effective co-operation can best be achieved by close personal touch between the workers and accordingly invites representatives of both bodies to take part regularly in its deliberations, in order to arrive at unity of plan and methods in the study of those fundamental problems which are similar or identical on both sides of the Atlantic.

Point 10 of the Agenda. Estimates.

The President observed that all proposals involving special expenditure had been discussed. The Resolutions of the Council involved for the present year, as shown in the revised Budget Statement which had been circulated, an Expenditure chargeable to revenue of 164.500 Kr. against a calculable revenue of 167.500 Kr. The Bureau arrived at this calculation by taking the total amount of contributions of the participating Governments, which now that Belgium was prepared to contribute at the rate of 10.000 Kr. would be 177.000 Kr., and adding to the sum interests on investments and bank balance amounting to an estimated sum of 8.000 Kr. and sale of publications amounting to an estimated sum of 2.500 Kr., which gave a total of 187.500 Kr. From this total sum the Bureau as a matter of precaution, having regard to the doubtful position of Italy*), had thought it prudent to deduct 20.000 Kr. There were certain other expenses chargeable in accordance with previous resolutions of the Council to the reserve fund. There were

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*) Since the date of the Council Meeting the Italian Government has notified its withdrawal from the Council.

no new charges under this head. With these observations he submitted the Budget as a whole for the approval of the Council. It was then adopted.

Point 11 of the Agenda. Nomination of the members of the Bureau, and the Finance Committee, and the Editorial Committee, and of the Editors etc.

Professor Johs. Schmidt proposed the re-election of the Bureau and was seconded by Professor Gilson. (Acclamation.)

The following were nominated members of the Finance Committee:— The President, *ex officio*, Professor Knudsen and Professor Johs. Schmidt as permanent members and Professor Rafael de Buen, Dr. Tesch and M. Lecourbe.

The Editorial Committee was re-elected with Professor Pettersson as Chairman.

Professor D'Arcy Thompson was re-elected as Editor for Statistics.

Dr. E. S. Russell was re-elected as Editor for the Journal, and Mr. J. R. Lumby was re-elected as Assistant Editor.

Professor M. Knudsen was re-elected Hydrographical Consultant.

Point 12 of the Agenda. Time and place for the next Council Meeting.

The President stated that it was difficult to decide at present upon the date, and as to the place he called upon Dr. Heinrici.

Dr. Heinrici spoke as follows first in German and then in French:—

Nachdem bei der kürzlich abgehaltenen Sitzung der Delegierten der Wunsch laut geworden ist, die Tagungen der Internationalen Meeresforschung von Zeit zu Zeit an einem anderen Ort als in Kopenhagen abzuhalten, und auch die dänischen Delegierten dem zu meiner Freude zugestimmt haben, erlaube ich mir, im Namen der deutschen Regierung Sie einzuladen, Ihre nächste Tagung in Deutschland abzuhalten. (Acclamation).

The President remarking that the Delegates had already decided the question by their applause thanked Dr. Heinrici for the kind invitation which would be accepted with gratitude and pleasure. The actual place, probably Berlin, would be decided later.

Point 13 of the Agenda. Other business.

The President impressed upon the Chairmen of Committees the necessity 1) of regulating their proceedings so as to keep the exact time allotted for the various meetings, and 2) of drawing up in advance an Agenda and strictly adhering to its points.

The President further remarked that he and Dr. le Danois were anxious to enlist the interest of the Council in the matters affecting the mollusc fishery, particularly mussels and oysters. The matter which mostly concerned them was regulations for the sanitary control of such shellfish. After referring to the comprehensive Report by Dr. Dodgson of the English Fishery Department on this subject he asked the Delegates of those countries interested in mollusc fisheries to endeavour to bring with them to the next meeting of the Council qualified experts who might form a special temporary Committee to discuss the possibility of the adoption of standard methods for dealing with this question.

Dr. le Danois indique qu'il ne s'agit pas de créer un Comité permanent, mais de provoquer une réunion exceptionelle; celle-ci étudierait deux questions 1) les maladies des huîtres, et 2) l'adoption d'une méthode internationale d'analyses des huîtres au point de vue du contrôle sanitaire de ces mollusques.

The President said that he would not ask the Council to pass a formal resolution but requested Dr. TESCH to communicate with the Delegates concerned on the subject. This Dr. TESCH agreed to do.

Point 13 of the Agenda. Conclusion of the meeting.

On the motion of the President the following votes of thanks were accorded by acclamation:—

To the Chairman of the Consultative Committee,
to the Administrative Secretary,
to the Staff of the Office, and
to the Danish Government for the arrangements made for the comfort of the Council and for their hospitality.

On the motion of Dr. LE DANOIS a vote of thanks was passed to Dr. RUSSELL for his excellent work as Editor of the Journal.

On the motion of Professor KNUDSEN a vote of thanks was passed to the President and the Bureau for their services, which the President briefly acknowledged.

Memorandum of the Bureau

on

Professor O. de Buen's Proposal for Biennial Meetings of the Council.

In a letter dated 11th October, 1930, addressed to the President, Professor Odón de Buen advanced the following proposition:—

> "Il sera hautement avantageux que les réunions plénières du Conseil se célèbrent chaque deux ans".

and he supported it with arguments which are repeated hereunder.

A preliminary discussion of Prof. Odón de Buen's letter took place at the Meeting of the Bureau at Lowestoft in November last, and the Bureau requested the President to prepare a memorandum summing up the arguments for and against the proposal.

The notes which follow have been prepared in accordance with that request and have been adopted by the Bureau. For convenience, Prof. Odón de Buen's arguments in favour of his proposal have been numbered and quoted in full, and notes are attached with reference to each of them.

1. "La réunion annuelle coûte cher aux Etats éloignés, et plus encore à ceux qui ont une monnaie dépréciée".

That annual meetings are more costly than biennial for the participating countries cannot be disputed. And it is clear that the increased cost falls most heavily on those countries which are most distant from the place of meeting and on those whose currency is depreciated. Some amelioration of this position might be afforded without recourse to biennial meetings, by changing the "venue" of the Council Meeting from year to year, so as to equalise the burden as nearly as possible. This would, however, involve additional expenditure from the Council's funds on account of the necessity for bringing to the meeting the necessary office staff, and generally through increase of incidental expenses.

2. We divide this paragraph for convenience into (a) and (b).

   (a) "Cette réunion annuelle ne permet pas d'apporter aux délibérations un volume considérable de travaux".

Nevertheless, it has proved very difficult to carry through the work of the Annual Meetings within a week. On this point, see also our note on (6) below.

   (b) "En se réunissant chaque année au printemps, on distrait de leurs travaux méthodiques, précisément dans cette époque critique pour les investigations de Biologie Marine, les chercheurs les plus actifs".

It is undoubtedly difficult to arrange meetings so as not to interfere with the work at sea. This year we are trying the experiment of a very early Spring meeting. The alternative appears to be a late autumn meeting. Neither is, as a rule, so pleasant as a summer meeting. It must be admitted that the interruption of work is a serious argument in favour of biennial meetings.

3. "Les frais généraux du Conseil, ceux de la publication des Rapports et Procès-Verbaux, se réduiraient considérablement par suite des réunions bi-annuelles".

There would be a saving on the Procès-Verbaux of about Kr. 3,000 in two years. It would, we think, be unfortunate if the Council curtailed its scientific publications, and we hope that, even if it be decided to meet biennially, the Council will continue to publish as many scientific reports as come within the rules it has laid down for itself on this subject and are judged to be of real scientific value.

4. "Une fois que les frais des Etats adhérents et des Instituts qui coopèrent, auraient été réduits, il est certain qu'il pourrait assister aux réunions un plus grand nombre de spécialistes des pays éloignés qui y apporteraient un volume double de travaux".

It is certainly desirable that the Council should have the advantage of the services of as many Experts as possible, but we are not sure that it is essential that they should, all of them, as a matter of course attend the Council Meetings. Delegates, by arranging to bring different Experts from year to year, can thus by alternation keep all their Experts in touch with the Council. There is a certain disadvantage in having very many Experts at a Council Meeting, because this creates a tendency to the formation of large Committees, and large Committees are not always the most effective.

There is, of course, an opportunity for the introduction of special Experts through the arrangements whereby the Council pays a considerable part of the expenses of a certain number of Experts for the special scientific meetings.

5. "Cette réunion bi-annuelle n'est pas un obstacle au point de vue administratif, car à chaque réunion on pourrait approuver le budget pour deux ans".

It would, of course, not be impossible to arrange biennial budgets. It would, however, be necessary that they should be framed on very elastic lines if there were a two-years interval between Council Meetings. It would be necessary to give fairly considerable powers to the Bureau to adjust the budget as occasion arose.

6. "Ce ne sera pas non plus un obstacle pour que les Commissions et les Comités puissent tenir toutes les réunions intermédiaires exigées par l'urgence ou l'importance de leurs travaux".

As Professor Odón de Buen points out, Meetings of Committees could be held as occasion required. Some meetings would have to be held. For instance, the Bureau would have to meet, as at present, at least twice a year. The Consultative Committee would have to meet at least once a year, and, in the altered circumstances, perhaps more often. The Editorial Committee would certainly have to meet once a year at least,

and it is probable that the occasion would arise for Meetings of a good many of the other Committees.

At present, the expenses of all Committee Meetings held between Council Meetings are paid by the Council, and the arrangements suggested by Professor Odón de Buen would thus, while relieving the participating countries of a certain amount of expenditure in connection with Meetings of the Council, involve the Council itself in greatly increased expenditure for meetings of Committees which normally meet when the Council is assembled, and when, accordingly, their travelling and subsistence expenses are paid by the Governments of their respective countries. The expenses entailed upon the Council by a Meeting in Copenhagen are comparatively trivial, so that there would be very little saving for the Council on that head through an arrangement of biennial meetings; on the other hand, as we have shown, considerable expenditure would be involved which at present is avoided. In order, therefore, to carry out Professor Odón de Buen's proposal, it would probably be necessary to make serious adjustments of other items of the budget — honoraria, publications, and the like. The only considerable saving to the Council as a set-off to the additional expense involved would be that referred to under (3) above.

Summary.

To sum up the advantages and disadvantages of a change from annual to biennial meetings. The sole advantages are, we think, the following:—

1) There would be a certain saving for the participating countries in respect of the expenses of attending meetings.
2) There would be less interference with research work.
3) The Council would save the cost of publication of the Procès-Verbaux once in two years — say, an annual saving of Kr. 1500 — and there would be some saving in respect of the usual expenses for printing, copying, and the like, in connection with the Council Meetings.

The disadvantages, in our opinion, are the following:—

I) There would probably be some congestion of work at a Council Meeting after a two years' interval, so that the meeting would have to be spread over a longer period, involving both inconvenience and some increase of cost to Delegates and Experts in those years in which the meetings were held.
II) The Council would have to sacrifice some of its control over the Budget by giving powers of adjustment to the Bureau.
III) As it would be necessary to hold, between Council Meetings, a considerable number of Committee Meetings which normally take place during the annual meeting, the Council would incur considerably increased expenditure in respect of travelling and subsistence expenses, unless the participating countries were prepared to meet the expenses of Delegates and Experts attending such Committee meetings; in that case the participating countries would lose most of the savings anticipated from substituting biennial for annual meetings.

IV) This is a point to which we have not hitherto referred. — The Council as a whole, and the participating countries individually, would lose in a great measure the opportunity provided by Council Meetings for mutual exchange of ideas, which is so greatly facilitated by oral intercourse. One of the chief advantages, as it appears to us, of an organisation like ours is that it brings together in one place a large number of persons from all the constituent countries, and enables them freely to discuss, not only the different aspects of the particular subject which is the occasion of their meeting, but other subjects also of mutual interest.

March, 1931.

ESTIMATES

of

the International Council for the Study of the Sea for the financial year 1931—32.

Receipts:—

Head	No.	Item	Kroner	Kroner
I	1	**BALANCE** on the 31st March 1931 constituting the reserve of the Council		148,115,50[1])
		ORDINARY RECEIPTS:—		
II	2	**Annual Contributions of the Governments**	157,000,00	
III	3	**Interests on bank deposit** ..... estimated	2,000,00	
IV	4	**Interests on Treasury Bonds**	6,000,00	
V	5	**Sale of publications** ..... estimated	2,500,00	167,500,00
		Total Receipts... estimated		315,615,50

[1]) **Balance:—**

Kr. 118,543,43 Danish Treasury Bonds.
» 29,572,07 Cash and deposited in the Handelsbank.
Kr. 148,115,50

Expenditure:—

Head	No.	Item	Kroner	Kroner
I		**ORDINARY EXPENDITURE:—**		
		Incidental expenses:—		
	1	President	6,000,00	
	2	Chairman of the Editorial Committee	2,000,00	
	3	Hydrographic Consultant	3,000,00	
	4	Editor for Statistics	2,000,00	
	5	Editor of the Journal	4,000,00	
			17,000,00	17,000,00
II		**Administrative Staff:—**		
	6	Administrative Secretary	13,200,00	
	7	1st Assistant Secretary	6,000,00	
	8	2nd Assistant Secretary	4,500,00	
	9	Hydrographic Staff	13,000,00	
	10	Statistical Assistant	4,000,00	
			40,700,00	40,700,00
III		**Expenses of the office in Copenhagen:—**		
	11	Rent, service, heating, stationery, books, binding of books, light, gas, telephone, telegrams, insurance, postage, freight, typewriting and miscellaneous expenses	15,000,00	15,000,00
IV	12	**Travelling expenses**	10,000,00	10,000,00
V	13	**Chairmen of Committees**	31,000,00	31,000,00
VI	14	**Printing and distribution**	39,500,00	39,500,00
VII	15	**Transferred to Pension Fund**	3,500,00	3,500,00
		to carry forward..		156,700,00

Head	No.	Item	Kroner	Kroner
		Brought forward...		156,700,00
VIII		**EXTRAORDINARY EXPENDITURE:—**		
	17	**Special Resolutions:—**		
		(a) Chargeable to revenue.		
		Supplementary expenditure for Binding of books	400,00	
		Isotherm charts of the North Sea.....	500,00	
		Submarine waves in Cattegat and Skagerak	3,500,00	
		Honorarium to Professor Henking.....	3,000,00	
		Experiments with Plankton nets	400,00	7,800,00
				164,500,00
		(b) Chargeable to reserve.		
		Mrs. Drechsel's pension	6,500,00	
		Cost of production of Prof. Joubin's Fiches Faunistiques	9,000,00	
		Honorarium to Prof. Joubin for four sets of Fiches Faunistiques.....	1,000,00	
		Tidal Institute	2,730,00	19,230,00
		Total Expenditure...		183,730,00

Annual Contributions of the Governments.

Belgium	10,000,00
Great Britain	20,000,00
Denmark.....	10,000,00
Finland.....	5,000,00
France	20,000,00
Germany.....	20,000,00
Irish Free State	5,000,00
Netherlands	10,000,00
Norway	10,000,00
Poland.....	10,000,00
Portugal	5,000,00
Spain	20,000,00
Sweden	10,000,00
Latvia	2,000,00
Kr....	157,000,00

Special Reserve for Pensions.

Treasury Bonds and Bank Deposit at 31st March 1930	Kr.	19,629,86
Interests from Treasury Bonds falling due in 1930—31	-	3,500,00
Interests from the Special Reserve itself ..... estimated	-	1,000,00
	Kr.	24,129,86

ESTIMATES *)

of

Publications to be printed during the financial year 1931—32.

Series	Subject	Authorisation	Estimated cost Kroner
Rapp. & Proc.-Verb.	Procès-Verbaux 1931	Standing order	3,200.00
—	Rapport Atlantique	— —	2,000.00
—	Reports of the Scientific Meetings	— —	5,000.00
—	Baltic Report	Proc.-Verb. current issue p. 19	2,500.00
Bulletin	Hydrographique	Standing order	5,000.00
—	Offprints of Bull. Hydr. for monthly distribution	Proc.-Verb. Vol. LX p. 12	1,500.00
—	Density Tables	Proc.-Verb. current issue p. 19	1,500.00
—	Statistique	Standing order	2,300.00
Journal du Conseil	Vol. VI, Nos. 2 & 3 Vol. VII, No. 1	— —	10,500.00
		Total...	Kr. 33,500.00

Other costs of publication:

Translations, etc.	Kr. 2,000.00
Distribution.....	- 4,000.00
	Kr. 39,500.00

*) NB. These Estimates are framed as closely as the conditions permit, but are inevitably subject to considerable variation according to the ultimate cost of production.

List of Members of Committees.

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Professor Johan Hjort, Chairman,
Mr. Oscar Sund,
Professor Johs. Schmidt,
Dr. Ed. le Danois,
Professor Rafael de Buen,
Prof. G. Gilson,
Prof. W. Mielck,
Dr. A. Bowman,
Mr. J. O. Borley,
Dr. A. C. Johansen,
Dr. K. A. Andersson,
Professor Martin Knudsen,
Professor H. H. Gran,
Professor D'Arcy W. Thompson.
Professor M. Siedlecki,
Dr. E. S. Russell.

North Eastern Area Committee.

Norway:	Professor Johan Hjort, Chairman,
	Mr. Oscar Sund, Vice-Chairman,
	Mr. S. K. Asserson,
Denmark:	Professor Johs. Schmidt,
England:	Dr. E. S. Russell,
France:	Commandant Charcot,
	failing him Dr. Ed. le Danois,
Germany:	Dr. H. Lübbert,
Scotland:	Dr. R. S. Clark,
Sweden:	Dr. K. A. Andersson,

North Western Area Committee.

Denmark:	Professor Johs. Schmidt, Chairman,
England:	Dr. E. S. Russell,
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Italy:	Professor G. Magrini,
Latvia:	Mr. V. Miezis,
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Poland:	Professor M. Siedlecki,
Portugal:	.....
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Dr. Ed. le Danois,
Dr. A. Bowman,
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Professor D'Arcy W. Thompson,
Professor G. Gilson,
Professor L. Joubin,
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Professor E. Ehrenbaum,
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The President,
Professor M. Knudsen,
Professor Johs. Schmidt,
Professor Rafael de Buen,
Mr. G. Lecourbe,
Mr. J. J. Tesch.

Special Committee.

Committee for the Study of the Tunny.

Mr. G. Belloc,
Dr. F. de Buen,
Dr. Frade.

Recommendations of the Consultative Committee.

The Committee met on March 23rd, 1931, at 2.30 p.m.
Chairman: Prof. JOHAN HJORT.

1. Special Scientific Meetings.

The Consultative Committee recommended that the same subjects be chosen for the Hydrographic Scientific Meeting 1932 as have been discussed this year and that Messrs. EKMAN, TAYLOR and THORADE be again invited to attend as special experts for the purpose. Prof. KNUDSEN was asked to act as Chairman.

The Committee resolved to ask the President to act as Convener and Chairman for the Biological Meetings 1932 and 1933. The main subject which had been agreed to last year but had been postponed, namely: "The effect on the stock of the capture of undersized fish", was again selected for discussion in both years.

The Committee further recommended the following procedure, suggested by Dr. BOWMAN, for these meetings:

a. That contributors to the 1932 meeting prepare abstracts of their papers for circulation two months before the meeting.
b. That at the meeting contributors give a short exposition (or lecture) on their views, and be prepared to answer any questions arising therefrom.
c. That the full papers handed to the Chairman of the meeting be circulated in proof before the 1933 meeting.
d. That at the 1933 meeting there should be discussion of the original and subsequent papers.
e. That all papers and reports of the discussion be printed after the 1933 meeting.

Dr. HEINRICI, Dr. RUSSELL, Dr. LE DANOIS and Prof. KNUDSEN were asked to discuss the general arrangements for the Scientific Meetings and to lay recommendations before the Committee at its meeting next year.

2. Cod Marking Experiments.

The Committee recommended that the countries interested in the Greenland and Icelandic fisheries should inform their fishermen of the extensive cod-marking experiments being carried out by Denmark in these remote areas, and should impress on them the importance of supplying information of the recapture of any marked fish.

3. Investigations during the Polar Year 1932—1933.

In view of the fact that in the Polar Year certain countries belonging to the Council are sending ships to make meteorological, magnetic and other observations in the polar

Recommandations du Comité Consultatif.

Le Comité se réunit le 23 Mars 1931 à 2h30 p.m.
Président: Prof. JOHAN HJORT.

1) Réunions Scientifiques spéciales.

Le Comité Consultatif recommande que l'on choisisse pour la Réunion Scientifique Hydrographique de 1932 les mêmes sujets que ceux qui ont été discutés cette année et que MM. EKMAN, TAYLOR et THORADE soient encore invités à y assister comme experts spéciaux dans ce but. Il est demandé au Prof. KNUDSEN d'y faire fonction de Président.

Le Comité décide de demander au Président du Conseil de faire fonction de convocateur et de Président pour les Réunions Biologiques de 1932 et 1933. Le sujet principal adopté pour l'année passée mais que l'on a remis à plus tard, à savoir: L'effet de la capture des poissons de taille inférieure, sur le stock, — est repris pour la discussion de ces deux années.

Le Comité recommande en outre pour ces réunions la procédure suivante proposée par le Dr. BOWMAN:

a. Que les contributeurs à la réunion de 1932 préparent des extraits de leurs communications pour les distribuer deux mois avant la réunion.
b. Que les contributeurs à cette réunion présentent un exposé (ou discours) de leurs vues et soient prêts à répondre à toute question pouvant s'en dégager.
c. Que les mémoires complets remis au Président de la réunion soient distribués en épreuves avant la réunion de 1933.
d. Qu'à la réunion de 1933 la discussion porte sur les mémoires originaux et ultérieurs.
e. Que tous les mémoires et comptes rendus de discussion soient imprimés après la réunion de 1933.

Il est demandé au Dr. HEINRICI, au Dr. LE DANOIS, au Dr. RUSSELL et au Prof. KNUDSEN d'étudier les arrangements généraux des Réunions Scientifiques et de présenter des recommandations au Comité à sa réunion l'année prochaine.

2) Expériences de Marquage du Cabillaud.

Le Comité recommande que les Pays intéressés dans les pêcheries du Grœnland et d'Islande fassent connaître à leurs pêcheurs que d'importantes expériences de marquage de cabillauds sont exécutées par le Danemark dans ces régions éloignées et insistent sur l'importance de la communication de toute information au sujet de la recapture d'un poisson marqué.

3) Investigations pendant l'Année Polaire 1932—1933.

Devant le fait que pendant l'Année Polaire certains Pays faisant partie du Conseil vont envoyer des navires pour faire des observations météorologiques, magnétiques

regions, it is recommended that the opportunity be taken to obtain hydrographical observations during the voyages. As countries not connected with the Council are planning very extensive hydrographical work in the Polar Sea during the Polar Year, it is further recommended that every effort should be made by all countries adhering to the Council to extend their hydrographical work in that year.

4. Convention for the Protection of Flounder and Plaice.

The Committee learns with interest that as a result of international co-operation a convention for the protection of the plaice and flounder in the Baltic has been put in force between the following countries: Poland, the Free City of Danzig, Germany, Denmark and Sweden.

5. Intercourse with other Institutions.

The Committee has heard with great interest the account given by Dr. H. B. Bigelow, Director of Wood's Hole Oceanographical Institute, of his plans for the investigation of the North Atlantic, particularly in its western part. It welcomes this important new development, and considers the moment opportune to enter into close co-operation both with Wood's Hole Oceanographical Institute and with the North American Council on Fisheries Investigations, believing that such co-operation will be fertile in results. It is of opinion that effective co-operation can best be achieved by close personal touch between the workers; and accordingly invites representatives of both bodies to take part regularly in its own deliberations, in order to arrive at unity of plan and of methods in the study of those fundamental problems which are similar or identical on both sides of the Atlantic.

6. Reports of Committees.

The Committee recommended that the Chairmen of Sub-Committees or special Committees which have met in the intervals between Council Meetings be asked to send reports of the proceedings and resolutions of the Committees to the Office, and to inform the Office as to the participation of the different members of the Committees in the meeting: such reports to be printed in the Administrative Report of the Council on the same conditions as the Reports of the Chairmen of other Committees.

It is recommended that the reasons set forth in the Memorandum of the Limnological Committee be accepted along with their suggestion that the Committee be renamed "The Salmon and Trout Committee" and that a sum of money be allocated to the Chairman who will prepare for the consideration of the Council a programme of work with due regard to the co-ordination of the work of the Committee with that of the regional Committees, and that a further sum of money be allocated to Prof. Henking for the conclusion of his report on the Salmonidae.

It is recommended that an honorarium be paid to the Acting Chairman of the Plankton Committee for the preparation of a memorandum on the plankton work to

et autres dans les régions polaires, il est recommandé que l'on saisisse l'occasion d'obtenir des observations hydrographiques au cours des voyages. Puisque des Pays sans rapports avec le Conseil projettent des travaux hydrographiques très étendus dans la Mer Polaire pendant l'Année Polaire, il est d'autant plus recommandé que tous les Pays adhérents au Conseil fassent tous leurs efforts pour étendre leur travail hydrographique pendant cette année.

4) Convention pour la Protection du Flet et de la Plie.

Le Comité apprend avec intérêt ce résultat de la coopération internationale: la mise en vigueur d'une convention pour la protection de la plie et du flet dans la Baltique intervenue entre les Pays suivants: la Pologne, la Ville Libre de Danzig, l'Allemagne, le Danemark et la Suède.

5) Relations avec d'autres Institutions.

Le Comité a reçu avec grand intérêt l'exposé présenté par le Dr. Bigelow, Directeur de l'Institut Océanographique de Wood's Hole, de ses plans pour l'investigation de l'Atlantique Nord, particulièrement dans sa partie occidentale. Il salue cet important progrès et juge le moment opportun pour entrer en étroite coopération tant avec l'Institut océanographique de Wood's Hole qu'avec le Conseil Américain pour les Recherches de Pêcheries, dans la pensée que cette coopération sera fertile en résultats. Il est d'avis qu'une coopération effective peut le mieux s'exercer par le contact personnel entre les travailleurs et conséquemment il invite les représentants des deux Institutions à prendre part régulièrement à ses délibérations, afin d'arriver à une unité de plan et de méthode dans l'étude des problèmes similaires ou identiques des deux côtés de l'Atlantique.

6) Rapports de Comités.

Le Comité recommande que les Présidents de Comités spéciaux ou de Sous-Comités qui se sont réunis dans l'intervalle des réunions du Conseil soient priés d'envoyer les rapports des opérations et résolutions des Comités au Bureau et d'informer le Bureau au sujet de la participation des divers membres des Comités à la réunion. Ces rapports seront imprimés dans le rapport administratif du Conseil dans les mêmes conditions que les rapports des Présidents des autres réunions de Comités.

Il est recommandé que les motifs invoqués dans le Mémorandum du Comité Limnologique soient acceptés, en même temps que la proposition de changer le nom du Comité en »Comité du Saumon et de la Truite«, qu'une somme d'argent soit allouée au Président qui préparera, pour être soumis au Conseil, un programme de travail tenant bien compte d'une coordination du travail du Comité avec celui des Comités régionaux, et qu'une nouvelle somme soit allouée au Prof. Henking pour l'achèvement de son rapport sur les Salmonides.

Il est recommandé qu'un honoraire soit payé au Faisant-fonction de Président du Comité Planctonique pour la préparation d'un mémorandum sur le travail planc-

be done, and the question whether this should be done by a special Committee or can be referred to the regional Committees to be discussed at the next meeting.

The following reports of Committees were presented by the Chairmen of the Committees concerned, and were passed by the Consultative Committee:—

North Eastern Area Committee
Atlantic Slope Committee
Northern North Sea Committee
Transition Area Committee
North Western Area Committee
Combined North Sea Committee
Southern North Sea Committee
Baltic Committee
Combined Baltic and Transition Area Committees
Hydrographic Committee
Statistical Committee
Whaling Committee
Plankton Committee
Salmon and Trout Committee

The Committee agreed to the following proposals which involve expenditure:—

Atlantic Slope Committee, II, 7 a.
Baltic Committee, II, 2.
Hydrographic Committee, II, 2, 3, and 4.
Plankton Committee, II, 2.
Statistical Committee, II.

tonique à exécuter, et sur la question, — à discuter à la prochaine réunion, — de savoir si ce travail doit être fait par un Comité spécial, ou s'il peut être déféré aux Comités régionaux.

Les rapports de Comités suivants sont présentés par les Présidents et agréés par le Comité Consultatif.

Comité du Secteur Nord-Est
Comité du Secteur Nord-Ouest
Comité du Plateau Continental Atlantique
Comité Combiné de la Mer du Nord
Comité du Nord de la Mer du Nord
Comité du Sud de la Mer du Nord
Comité du Secteur de Transition
Comité Baltique
Comité Combiné de la Baltique et du Secteur de Transition
Comité Hydrographique
Comité du Plancton
Comité Statistique
Comité Limnologique
Comité de la Baleine

Le Comité agrée les propositions suivantes qui comportent des dépenses:

Comité du Plateau Continental Atlantique, II, 7 a.
Comité Baltique, II, 2.
Comité Hydrographique, II, 2, 3 et 4.
Comité du Plancton, II, 2.
Comité Statistique, II.

Programmes and Reports of Area Committees.

North Eastern Area Committee.

Chairman: Professor JOHAN HJORT.
Vice-Chairman: Mr. OSCAR SUND.
The Committee met at 2.30 p.m. on March 25th, 1931.

I. Proceedings.

1) Mr. SUND reported shortly on the main work of the year, as detailed in the Administrative Report circulated. He acknowledged contributions of fish measurements from Germany and England. From these measurements it was shown that as far as 1931 is concerned the ideas about the cod population gained from measurements of Norwegian catches were substantiated. It could not, however, be held that investigations of the Norwegian catch would prove sufficient every year. It was therefore strongly to be recommended that fish should be measured on trawlers in the Barents Sea. As a result of the contributions mentioned above, the cod population is now more fully described than has been possible hitherto. More work on saithe and haddock was wanted.

   Prof. MIELCK stated that the German work referred to in the report, consisting of market investigations and voyages made by German scientists in trawlers, would be continued regularly.

2) The following questions were discussed:— Temperature of the cod habitat; possibility of spawning taking place outside the known areas and also of some fish not spawning every year.

3) Plankton investigations. The Chairman emphasised the importance of the work carried out by Prof. GRAN on the limiting factors in diatom development and recommended investigation of the occurrence of Euphausids at different stages of maturity.

   In the discussion which followed Dr. BIGELOW, Prof. JOHS. SCHMIDT, Prof. MIELCK and Prof. D'ARCY THOMPSON took part.

4) Methods. Mr. SUND recommended the general adoption of the method of measurement devised by Prof. D'ARCY THOMPSON.

   Mr. DANNEVIG's proposal for standardising methods of age determination in Gadoids was discussed and was referred for consideration by the members until the next meeting.

5) Prof. HJORT and Mr. SUND were re-elected Chairman and Vice-Chairman for the ensuing year.

II. Recommendation.

It was recommended that the work done in past years as a result of the Committee's recommendations should be summarised and reported upon.

Programmes et Rapports des Comités des Secteurs.

Comité du Secteur Nord-Est.

Président: Prof. Johan Hjort.
Vice-Président: Mr. Oscar Sund.
Le Comité se réunit le 25 Mars 1931 à 2h30 p.m.

I. Compte rendu.

1) M. Sund fait brièvement rapport sur le principal travail de l'année qui est détaillé dans le Rapport Administratif distribué. Il accuse réception de mensurations de poisson d'Allemagne et d'Angleterre. Il montre que pour ce qui concerne 1931, ces mensurations consolident les notions obtenues de la mensuration des captures Norvégiennes, au sujet de la population de cabillaud. Cependant on ne pourrait pas soutenir que l'investigation de la capture Norvégienne se montrerait suffisante chaque année. Il est donc fortement recommandé que l'on mesure des poissons à bord des chalutiers dans la Mer de Barents. Comme résultat des contributions mentionnées, la population de cabillaud est à présent plus complètement décrite qu'il n'avait été possible de le faire jusqu'ici. On demande plus de travail sur le colin et sur l'aiglefin.

Le Prof. Mielck déclare que le travail Allemand mentionné dans le rapport et consistant en recherches de marchés et de voyages faites par des naturalistes Allemands à bord des chalutiers, sera continué régulièrement.

2) Les questions suivantes sont discutées: Température de l'habitat du cabillaud, possibilité de la production du frayage en dehors des régions connues et aussi d'un frayage non annuel pour certains poissons.

3) Investigations planctoniques. Le Président insiste sur l'importance du travail accompli par le Prof. Gran sur les facteurs limitatifs du développement des diatomées et recommande des recherches sur l'occurrence des Euphausides à différents stades de maturité.

Le Dr. Bigelow, le Prof. Johs. Schmidt, le Prof. Mielck et le Prof. D'Arcy Thompson prennent part à la discussion qui suit.

4) Méthodes. M. Sund recommande l'adoption générale de la méthode imaginée par le Prof. D'Arcy Thompson.

La proposition de Mr. Dannevig pour la standardisation des méthodes de la détermination de l'âge des Gadoides est discutée et sa prise en considération est différée par les membres jusqu'à la réunion prochaine.

5) Le Prof. Hjort et M. Sund sont réélus Président et Vice-Président pour l'année suivante.

II. Recommandation.

Il est recommandé qu'il soit fait un rapport résumant le travail accompli les années précédentes à la suite des recommandations du Comité.

North Western Area Committee.

Chairman: Professor Johs. Schmidt.
The Committee met at 2.30 p.m. on March 24th, 1931.

I. Proceedings.

1) The Chairman called to mind the memory of the late Vice-Chairman, who had so ably occupied the Chair during the two year's absence of the Chairman, and welcomed Dr. H. B. Bigelow.

2) The Scientific Report for 1928—1929 was laid before the Committee and a short account of the contents given by the Chairman; a discussion arose in which the following took part:— Dr. Le Danois, Prof. Hjort, Dr. Bigelow and Prof. Ehrenbaum.

3) Dr. Tåning reported on the results of the Danish investigations on the fluctuations of the cod in Icelandic and Faroese waters, based on the analysis of measurements and age determinations of commercial catches in the years 1928—1930. He showed that the cod fishery in Icelandic waters is founded upon a few special year-classes in the years under consideration; the year-class 1919 has been a rich one, but the 1922 year-class is at present by far the most important; furthermore the stock of cod in Faroe waters was briefly dealt with. (A report on the subject will shortly appear in "Meddel. fra Kommissionen for Havundersøgelser").

Mr. Sund, Prof. Ehrenbaum, Prof. Hjort and Dr. Russell took part in the discussion.

4) The Chairman reported on Danish investigations on the biology of the larval stages of Anguilla and the Conger. He drew special attention to the similarity between the distribution of the larvae of the European and American Anguilla and Conger; the latter has proved to be easily separable into two distinct species, the American Conger having fewer vertebrae than the European.

5) Prof. Schmidt was re-elected Chairman for the ensuing year.

II. Recommendations.

1) The following programme for the ensuing year was adopted:—

Denmark: The "Dana" will cruise for 3 months in the North Atlantic. After passing through the English Channel, a pelagic and hydrographic section will be made to the Azores, and from there to Iceland.

In Faxe Bay the series of trawl hauls in extra- and intra-territorial waters begun in 1924 will be finished.

Sections will be made in the Denmark Strait to study any drift of pelagic cod fry from Iceland to Greenland. At the Faroes the 0-Group cod will be specially investigated.

In collaboration with Icelandic biologists the collection of material for a study of the fluctuations of the cod will be continued. Similar work in Faroese waters will also be undertaken.

Comité du Secteur Nord-Ouest.

Président: Prof. Johs. Schmidt.
Le Comité se réunit le 24 Mars 1931 à 2h30 p.m.

I. Compte rendu.

1) Le Président rappelle la mémoire du défunt Vice-Président qui a fait, — avec tant de capacité, — fonction de Président pendant l'absence de deux années du Président et souhaite la bienvenue au Dr. H. B. Bigelow.
2) Le Rapport Scientifique pour 1928—1929 est déposé devant le Comité et un bref aperçu de son contenu est donné par le Président. Les membres suivants ont pris part à la discussion qui suivit: le Dr. le Danois, le Prof. Hjort, le Dr. Bigelow et le Prof. Ehrenbaum.
3) Le Dr. Tåning fait rapport sur les résultats des investigations Danoises sur les fluctuations du cabillaud dans les eaux d'Islande et de Faroe, basés sur l'analyse des mensurations et des déterminations d'âge de pêches commerciales pendant les années 1928—1930. Il montre que la pêcherie du cabillaud dans les eaux islandaises, dans les années sous considération, repose sur un petit nombre de classes annuelles particulières; la classe de 1919 a été abondante, mais la classe de 1922 est, à présent, de loin, la plus importante, — de plus, le stock de cabillaud dans les eaux de Faroe est brièvement traité. (Un rapport sur ce sujet paraîtra sous peu dans les »Meddel. fra Kommissionen for Havundersøgelser«.)

   M. Sund, le Prof. Ehrenbaum, le Prof. Hjort et le Dr. Russell ont pris part à la discussion.
4) Le Président fait rapport sur les investigations Danoises sur la biologie des stades larvaires de l'Anguille et du Congre. Il attire spécialement l'attention sur la similitude qui existe, dans la distribution des larves, d'une part entre l'Anguille, Américaine et Européenne, et, de l'autre, le Congre: celui-ci se laisse aisément diviser en deux espèces distinctes, — le Congre Américain ayant moins de vertèbres que l'Européen.
5) Le Prof. Schmidt est réélu Président pour l'année suivante.

II. Recommandations.

1) Le programme suivant pour l'année prochaine est adopté:

   Danemark: Le »Dana« croisera pendant trois mois dans l'Atlantique Nord. Après avoir passé la Manche, il fera une croisière pélagique et hydrographique vers les Açores, puis de là vers l'Islande.

   Dans la Baie de Faxe les séries de chalutages dans les eaux extra- et intraterritoriales commencées en 1924 seront achevées.

   Des sections seront faites dans le Détroit de Danemark pour étudier la dérive du fretin pélagique de cabillaud, de l'Islande vers le Groenland. Aux Faroe le cabillaud du groupe 0 sera spécialement étudié.

   On continuera, en collaboration avec les biologistes Islandais, la réunion de matériaux pour l'étude des fluctuations du cabillaud. Un travail similaire sera entrepris dans les eaux des Faroe.

Marking experiments with the cod will be continued on a larger scale (1) in Greenland, on the banks and in the fjords, (2) in Iceland, on the south and north coast, (3) at the Faroes.

England: Any available information from commercial trawlers or the fish markets will be furnished. Collections of general statistics will be made.

The new survey ship "Challenger", when finished, will make a cruise to the banks off Rockall and Iceland.

France: Continued observations in Greenland waters, which may be extended to Iceland.

Germany: No special work proposed.

Norway: An expedition to the Northern Atlantic will investigate the waters round Jan Mayen; material for racial investigation of the cod will be collected.

Surface observations on the mail steamer Bergen—Iceland. It is hoped that the regular service of surface observations between Bergen and Iceland will be in operation from the beginning of March 1931. The necessary funds have been granted and the steamship company (Bergenske Dampskibsselskap) has given permission. The service will include the running of a steel-in-mercury thermograph on the engine intake pipe and the usual surface salinity samples and temperature readings every 4 hours.

Scotland: The "Explorer" expects to visit the Faroes and Faroe Bank for trawling experiments and to make two hydrographical sections in the Faroe-Shetland Channel.

2) The Committee recommended unanimously that the countries interested in the Greenland and Icelandic fisheries should inform their fishermen of the extensive cod-marking experiments being carried out by Denmark in these remote areas, and should impress on them the importance of supplying information of the recapture of any marked fish.

Atlantic Slope Committee.

Chairman: Dr. Ed. le Danois.
Vice-Chairman: Prof. Rafael de Buen.
The Committee met on March 25th, 1931, at 10.00 a.m.

I. Proceedings.

1) The Chairman gave an account of the work accomplished by the various countries in the year 1930 and regretted that the programme had not been completely realised. He also referred to the somewhat late publication of the Rapport Atlantique 1929 and the good progress made with the printing of the "Faune Ichthyologique" edited by Professor Joubin.

Des expériences de marquage du cabillaud seront poursuivies sur une large échelle, 1) au Groenland, sur les bancs et dans les fjords, 2) en Islande, sur la côte Sud et sur la côte Nord et 3) aux Faroe.

Angleterre: On fournira toutes les informations que l'on pourra obtenir des chalutiers commerciaux ou des marchés aux poissons. On fera des réunions de statistique générale.

Le nouveau navire d'inspection, le »Challenger«, quand il sera achevé, fera une croisière vers les bancs au large de Rockall et en Islande.

France: On continuera dans les eaux Groenlandaises des observations qui pourront être étendues à l'Islande.

Allemagne: On ne projette pas de travail spécial.

Norvège: Une expédition dans le Nord Atlantique explorera les eaux autour de Jan Mayen; on réunira des matériaux pour l'étude des races du cabillaud.

Observations de surface sur les steamers de la ligne Bergen—Islande. On espère que le service d'observations de surface entre Bergen et l'Islande marchera régulièrement à partir du commencement de Mars 1931. Les fonds nécessaires sont accordés et la Compagnie de steamers (Bergenske Dampskibsselskap) a donné sa permission. Le service comprendra le fonctionnement d'un thermographe »steel-in-mercury« sur le tuyau d'introduction de la machine ainsi que les prises usuelles d'échantillons pour la salinité de surface et des lectures de température toutes les 4 heures.

Ecosse: L'»Explorer« espère visiter les Faroe et le Banc de Faroe pour y faire des expériences de chalutage et deux sections sur le Canal Faroe-Shetland.

2) Le Comité recommande unanimement que les Pays intéressés dans les pêcheries d'Islande et du Groenland fassent connaître à leurs pêcheurs que d'importantes expériences de marquage de cabillauds sont exécutées par le Danemark dans ces régions éloignées et insistent sur l'importance de la communication de toute information au sujet de la recapture d'un poisson marqué.

Comité du Plateau Continental Atlantique.

Président: Dr. Ed. le Danois.
Vice-Président: Prof. Rafael de Buen.
Le Comité se réunit le 25 Mars 1931 à 10 h. a. m.

I. Compte rendu.

1) Le Président rend compte des travaux accomplis pendant l'année 1930 par les différents Etats, et regrette que le programme n'ait pas été complètement réalisé. Il signale d'autre part la publication un peu tardive du Rapport Atlantique 1929 et la bonne marche de l'impression des cahiers de fiches faunistiques édités sous la direction de M. le Professeur Joubin.

2) Mr. HICKLING described his work on the hake, especially in regard to its growth, sexual maturity and age distribution.
3) Mr. BELLOC explained a technique which he proposed for measuring tunny in accordance with paragraph 7a of the programme for 1930.
4) Mr. LE GALL stated the results of the conference on the methods of measuring sardines held at Lisbon in September 1930. The Chairman took the opportunity to thank the Portuguese Government and Dr. RAMALHO in the name of the Committee for the welcome extended to the experts.
5) The programme of the Committee was considered and various modifications made resulting in the programme given below.
6) The Committee discussed the papers to be published in the next Rapport Atlantique (1930).
7) Mr. FARRAN mentioned that the periodical cruises undertaken by the Irish Free State will not in future be devoted solely to hydrological work but also to trawling experiments.
8) The Committee expressed the wish that the results of the cruises undertaken in June/July 1930 by the Norwegian vessel "Armauer Hansen" in co-operation with the Portuguese vessel "Albacora" be communicated to them.

   The Committee further expressed the wish that the work done in the Committee's region by the "Dana" in the course of her various cruises be communicated and published.
9) The Chairman stated that Dr. ALLEN, F. R. S., will be replaced at his own request by Mr. HARVEY as British representative on the Committee.
10) Prof. H. B. BIGELOW, who kindly assisted in the meeting, made an important communication on the activity of the North American Council on Fisheries Investigations and on the foundation of the Oceanographical Institute at Wood's Hole (Rockefeller Foundation). This institution will possess a research vessel, now under construction in Copenhagen. Professor BIGELOW outlined the plans for her first cruises, which were designed to study the hydrological conditions of the North Atlantic. The Chairman thanked Professor BIGELOW for his information and in the discussion which followed Messrs. SCHOTT, DEFANT, LE DANOIS, R. DE BUEN took part.
11) The Chairman and the Vice-Chairman were re-elected for the ensuing year.

II. Recommendations.

1) For the purpose of continuing the study of the hydrographical and biological conditions in the Bay of Biscay periodical quarterly cruises will be made by the Governments of France, Spain and the Irish Free State, the cruises being as follows:—

Spain: 8° W. from the coast to 47° N.
6° W. from the coast to 44°30′ N.
Along 43° N. from the coast to 10° W.

2) M. Hickling fait une communication sur les travaux concernant le merlu, notamment en ce qui concerne la croissance, la sexualité et la répartition par classes de ce poisson.
3) M. Belloc expose un projet sur la technique ichthyométrique des Thonnidés, en exécution de l'article 7a du programme de l'année 1930.
4) M. le Gall fait un exposé des résultats de la conférence sur la technique ichthyométrique de la sardine tenue à Lisbonne en Septembre 1930. A cette occasion, le Président remercie le Gouvernement portugais et le Dr. Ramalho au nom du Comité pour la cordiale réception faite aux experts.
5) Le Programme du Comité est ensuite étudié dans son ensemble et diverses modifications sont apportées pour l'établissement du programme ci-dessous.
6) Le Comité examine ensuite les travaux à publier dans le prochain Rapport Atlantique (1930).
7) M. Farran indique que désormais les croisières périodiques effectuées par l'Etat Libre d'Irlande ne seront pas uniquement consacrées à des travaux hydrologiques mais aussi à des expériences de chalutage.
8) Le Comité émet le vœu que les résultats des croisières effectuées en juin-juillet 1930 par le vaisseau norvégien "Armauer Hansen" en liaison avec le navire portugais "Albacora" lui soient communiqués.

   De même le Comité émet le vœu que les travaux effectués au cours des différentes croisières du "Dana" dans le secteur d'études du Comité fassent l'objet de communications et de publications.
9) Le Président rend compte que le Dr. Allen, F.R.S., sur sa demande sera remplacé comme représentant de la Grande Bretagne au Comité par M. Harvey.
10) Le professeur H. B. Bigelow ayant bien voulu assister à la séance fait une importante communication sur l'activité du Conseil des Pêcheries de l'Amérique du Nord et sur la fondation de l'Institut océanographique de Wood's Hole (Fondation Rockefeller). Cette institution possédera un navire de recherches actuellement en construction à Copenhague. Le Professeur Bigelow expose ensuite les itinéraires projétés pour les premières croisières, en vue d'étudier les conditions hydrologiques de l'Atlantique Nord. Le Président remercie le Professeur Bigelow de cet exposé et une importante discussion, à laquelle prennent part MM. Schott, Defant, le Danois, R. de Buen, est engagée sur ce sujet.
11) Le Président et le Vice-Président sont réélus pour l'année suivante.

II. Recommandations.

1) En vue de continuer l'étude des conditions hydrographiques et biologiques du Golfe de Gascogne, des croisières périodiques trimestrielles seront effectuées par les gouvernements de la France, de l'Espagne et de l'Etat Libre d'Irlande, dans les conditions suivantes:

Espagne: 8° W. G. de la côte jusqu'au 47° N.
6° W. G. de la côte jusqu'au 44°30′ N.
le long du 43° N. de la côte jusqu'au 10° W. G.

France: From Ushant to 9° W. (49° N.).
9° W. from 49° N. to 47° N.
From 47° N. (9° W.) to Ushant.
Ireland: 8° W. from the coast to 49° N.
49° N. between 8° and 9° W.
9° W. from 49° N. to the coast of Ireland.

These cruises will be undertaken during the months of February, May, August and November.

During each cruise deep sea observations will be made at one or more stations off the Atlantic Slope, if possible from the surface to the bottom. The cruises will be utilized for plankton observations.

2) The study of the western Channel will be undertaken by Great Britain, by means of periodical cruises with the Marine Biological Association's vessel.

3) The Irish Free State will undertake cruises to the south-west of Ireland to determine the position of the 35.5 $^0/_0$ isohaline.

4) The investigations of the Committee in the waters of the Canaries will be continued by the new Spanish laboratory in these islands.

5) The investigations in the Bay and the Straits of Gibraltar will be continued by Spain.

6) The investigations in the Straits of Gibraltar will be made in accordance with those of the Mediterranean Commission.

7a) In accordance with the report presented by Mr. Belloc the Committee considered it necessary to ask the International Council that a special meeting of experts be held to determine ichthyometrical methods for the racial study of the tunny. This meeting would be held in conjunction with experts of the International Commission of the Mediterranean. The experts designated for the Committee are Messrs. Belloc (France), F. de Buen (Spain), Frade (Portugal). This meeting will give especial attention to a method for the age determination of the tunny.

b) The investigations on the sardine will be continued, using the methods decided upon at the Lisbon meeting.

c) The investigations on the hake will be undertaken in the northern area by a Sub-Committee consisting of Messrs. Belloc (France), Farran (Ireland), Hickling (England), and in the southern area by Spanish experts.

8) The study of the herring races will be continued in the western Channel and in the region to the south-west of the British Isles.

From the comparative observations made on the Fladen, North Sea, Smalls and Inishtrahull trawling grounds it appears that these various grounds have a number of characters in common, namely,

a) as regards herring, that the fish living on these grounds are in a state of pre-maturation.

b) as regards hydrology, that the waters are at the transgressive limit of the isohaline 35 $^0/_{00}$.

France: d'Ouessant au 9° W. G. (49° N.)
9° W. G. du 49° N. au 47° N.
du 47° N. (9° W.) à Ouessant.
Irlande: 8° W. G. de la côte au 49° N.
49° N. entre 8° et 9° W. G.
9° W. G. du 49° N. à la côte d'Irlande.

Ces croisières seront effectuées aux mois de février, mai, août et novembre.

A chaque sortie, une ou plusieurs stations comprendront des observations en eau profonde; si possible de la surface au fond, en dehors du Plateau continental. Les sorties seront utilisées pour des pêches planctoniques.

2) L'étude de la Manche Occidentale sera faite par les soins de la Grande-Bretagne sous forme de croisières périodiques, exécutées par le navire de la "Marine Biological Association".

3) L'Etat Libre d'Irlande exécutera des croisières au Sud-Ouest de cette île afin de préciser la position de la ligne isohaline 35,5 $^{0}/_{00}$.

4) Les études du Comité dans la région des Canaries seront continuées par le nouveau laboratoire espagnol de ces îles.

5) Les études dans la baie et le détroit de Gibraltar seront continuées par l'Espagne.

6) Les recherches dans le détroit de Gibraltar seront effectuées en accord avec celles de la Commission de la Méditerranée.

7a) A la suite du rapport déposé par M. Belloc le Comité estime nécessaire de demander au Conseil International qu'une réunion spéciale d'experts se tienne pour préciser les méthodes ichthyométriques en vue de l'étude ethnique des Thonnidés. Cette réunion aura lieu en liaison avec des experts de la Commission internationale de la Méditerranée. Les experts désignés pour le Comité seront MM. Belloc (France), F. de Buen (Espagne), Frade (Portugal). Cette réunion d'experts étudiera spécialement une méthode de détermination de l'âge des Thonnidés.

b) Les études sur les sardines seront continuées en application de la technique établie à la réunion de Lisbonne.

c) Les études sur le merlu seront effectuées dans le secteur nord par un sous-comité composé de MM. Belloc (France), Farran (Irlande), Hickling (Angleterre); et pour le secteur sud par des spécialistes espagnols.

8) Les études des races de hareng seront continuées en Manche Occidentale et dans la région sud-ouest des îles Britanniques.

Il résulte des observations comparatives effectuées sur les fonds de chalutage des Fladen, de la Mer du Nord, des Smalls et d'Inishtrahull, que ces différents fonds présentent une communauté de caractères, à savoir:

a) au point de vue du hareng, que ces poissons se trouvent en état de prématuration sur ces fonds.

b) au point de vue hydrologique, que les eaux sont à la limite transgressive de l'isohaline 35 $^{0}/_{00}$,

c) as regards depth, that the grounds lie at the limit of Murray's "mud-line".

d) as regards plankton, that the species which occur here show the predominance of Meganyctiphanes. Consequently, the Committee asked that a detailed study, specially concerning the grounds of the Smalls and of Inishtrahull, be made in these waters in order to procure new information bearing on the general biology of the herring. Messrs. LE GALL and WATKINS will be specially charged with this study. Miss FROST (Ireland) will also take part in it.

9a) Biological statistical methods will be applied to all questions studied by the Committee.

b) It is desirable that the hydrological observations be accompanied by biological observations, since certain species are characteristic of definite ranges of depth or of definite physico-chemical conditions.

10) Plankton studies will be undertaken during the various cruises in order to collect information on the plankton which forms the food of whales.

11) In order to facilitate the rapid distribution of information between the members of the Committee after each cruise the Committee recommended that the salinity be determined on board by a suitable physical method. Provisional lists will be circulated by each member of the Committee to his colleagues.

12) A study of the marketable size of fish will be undertaken by the Committee in the various countries, based upon the first sexual maturity of the bottom species, i.e. the hake, the flat fish etc. Reports and suggestions on this question will be furnished at the next Committee Meeting by Messrs. HICKLING (Great Britain), LE DANOIS (France), ODÓN and F. DE BUEN (Spain).

13) The descriptions of the Atlantic Fauna will continue to be published by the International Council under the direction of Prof. JOUBIN on the present lines.

Combined North Sea Committee.

(Now: **Combined North Sea and Eastern Channel Committee**).

Vice-Chairman: Prof. G. GILSON.

The Committee met on 25th and 26th March, 1931, at 10 a.m. and 12.15 p.m. respectively.

I. Proceedings.

The acting Chairman opened the meeting and referred to the loss of the Chairman.

1) The report of the acting Chairman for the year 1930 was approved.

2) The following papers were read and discussed:—

a) After introductory remarks by Prof. EHRENBAUM, Dr. SCHNAKENBECK gave a report on the results of his investigations on herring races of the North Sea.

c) au point de vue bathymétrique, que ces fonds se trouvent à la limite de la "mud-line" de Murray,

d) au point de vue planktonique, que les espèces qui s'y remontrent marquent la prédominance des Meganyctiphanes. En conséquence le Comité demande qu'en ce qui concerne particulièrement les fonds des Smalls et d'Inishtrahull une étude détaillée soit effectuée dans ces régions en vue d'apporter de nouveaux renseignements à la biologie générale du hareng. MM. LE GALL et WATKINS seront spécialement chargés de cette étude. Miss FROST (Irlande) coopérera à cette étude.

9a) La méthode des statistiques biologiques sera appliquée dans une très large mesure à toute question étudiée par le Comité.

b) Il est désirable que les observations hydrologiques soient accompagnées d'observations biologiques étant donné que certaines espèces sont caractéristiques de niveaux déterminés ou de conditions physicochimiques précises.

10) Des études planctoniques seront effectuées au cours des diverses sorties en vue de recueillir des renseignements sur le plancton servant de nourriture aux cétacés.

11) En vue de faciliter le service d'information rapide entre les membres du Comité après chaque sortie des navires le Comité recommande la détermination de la salinité à bord par une méthode physique appropriée. Des listes provisoires seront adressées par chaque membre du Comité à ses collègues.

12) Une étude sur la taille marchande des poissons sera entreprise par le Comité dans les différents Etats, en se basant sur la première maturité sexuelle des espèces de fond, notamment du merlu, des poissons plats etc. Des rapports et suggestions seront fournis à la prochaine réunion du Comité sur cette question par MM. HICKLING (Grande Bretagne), LE DANOIS (France), ODÓN et F. DE BUEN (Espagne).

13) Les fiches faunistiques continueront à être éditées par le Conseil International sous la direction de M. le Professeur JOUBIN, dans les conditions actuelles.

Comité Combiné de la Mer du Nord.

(Aujourd'hui: **Comité Combiné de la Mer du Nord et de la Manche Orientale**).

Vice-Président: Prof. G. GILSON.

Le Comité se réunit le 25 et le 26 Mars 1931, à 10^h a.m., et à 12^h15 respectivement.

I. Compte rendu.

Le Faisant-fonction de Président ouvre la séance et rappelle la perte du Président.

1) Le rapport du Faisant-fonction de Président pour l'année 1930 est approuvé.

2) Les communications suivantes sont présentées et discutées:

a) Après quelques remarques introductives par le Prof. EHRENBAUM, le Dr. SCHNAKENBECK fait rapport sur les résultats de ses investigations sur les races du hareng de la Mer du Nord.

b) Prof. MIELCK reported on his enquiries as to the possibility of indicating on fishery charts the characteristic bottom fauna. He laid before the Committee an illustrated paper, showing the way in which the data available could be utilised for this purpose.

c) Dr. BLEGVAD reported on bottom fauna evaluation carried on by him in the last few years in the Limfjord and in the North Sea.

3) The proposal contained in the report of the acting Chairman, namely, to alter the name of the Committee to "Combined North Sea and Channel Committee" was discussed.

4) Prof. MIELCK referred to the desirability of adopting a standard plankton net and said that, as a result of his and Dr. KÜNNE's experiments, the Hensen net seemed to be the most suitable as a standard for comparison with other plankton nets.

A discussion ensued, in which Dr. BOWMAN insisted upon the difficulty of quantitative plankton observations, especially on account of the "patchiness" of the distribution of planktonic forms in the sea.

5) M. LE GALL reminded the Committee that at the Lowestoft meeting it was agreed that the desirability of the continuation of the Herring Sub-Committee should be impressed upon the Consultative Committee by the Chairman of the Combined North Sea Committee.

6) Prof. GILSON was elected Chairman of the Committee.

II. Recommendations.

1) It was recommended that, with regard to the experiments proposed at the Lowestoft meeting to deal with the methods of collecting herring larvae, the Hensen net should be regarded as furnishing a reliable standard for comparing the relative catching power of nets.

2) It was recommended that in view of the future preparation of special Bottom Fauna charts intended for fishery purposes, information as to species, locality and time, from reliable fishery captains and from research vessels, should be sent to Prof. MIELCK.

3) It was recommended that the alteration of the name of the Committee to "Combined North Sea and Channel Committee" be proposed for the decision of the Bureau.

Northern North Sea Committee.

Chairman: Dr. ALEXANDER BOWMAN.

The Committee met on March 26th, 1931, at 12.15 p.m. and at 2.30 p.m.

I. Proceedings.

1) The Administrative Report for 1930 was adopted.

2) Herring.

a) A survey was made by the Chairman of the autumn and spring spawning grounds in Scottish waters, based on catches of "spawny" haddocks.

b) Le Prof. Mielck fait rapport sur ses recherches au sujet de la possibilité d'indiquer sur des cartes de pêcherie la faune de fond caractéristique. Il présente au Comité un travail illustré montrant la manière dont les données disponibles pourraient être utilisées dans ce but.

c) Le Dr. Blegvad fait rapport sur l'évaluation de la faune du fond conduite par lui dans le Limfjord et dans la Mer du Nord.

3) La proposition, contenue dans le rapport du faisant-fonction de Président, de changer le nom du Comité en »Comité Combiné de la Mer du Nord et de la Manche« est discutée.

4) Le Prof. Mielck rappelle qu'il est désirable qu'un filet à plancton standard soit adopté et ajoute qu'il résulte de ses expériences et de celles du Dr. Künne que le filet de Hensen paraît le mieux convenir comme standard de comparaison avec d'autres filets.

Une discussion s'en suit: le Dr. Bowman insiste sur la difficulté des observations quantitatives du plancton particulièrement par suite de la distribution discontinue des formes planctoniques dans la Mer.

5) M. le Gall rappelle que la réunion de Lowestoft a été d'accord pour désirer que le Sous-Comité du Hareng soit continué et que le Président du Comité Combiné de la Mer du Nord insiste en ce sens auprès du Comité Consultatif.

6) Le Prof. Gilson est élu Président du Comité.

II. Recommandations.

1) Il est recommandé — que, pour les expériences proposées à la réunion de Lowestoft, sur les méthodes de prélèvement des larves de hareng, le filet de Hensen soit considéré comme constituant un standard sûr pour la comparaison du pouvoir de capture des filets.

2) Il est recommandé qu'en vue de la préparation future de cartes spéciales de la faune du fond, les informations quant à l'espèce, la localité et le temps, reçues de patrons pêcheurs de confiance et des navires de recherche, soient transmises au Prof. Mielck.

3) Il est recommandé que le changement du nom du Comité en: »Comité Combiné de la Mer du Nord et de la Manche«, soit proposé à la décision du Bureau.

Comité du Nord de la Mer du Nord.

Président: Dr. Alexander Bowman.

Le Comité se réunit le 26 Mars 1931 à 12h15 p.m., et à 2h30 p.m.

I. Compte rendu.

1) Le Rapport Administratif pour 1930 est adopté.

2) Hareng.

a) Une inspection a été faite par le Président sur les champs de ponte d'Automne et de Printemps indiqués par les captures de"spawny"aiglefins.

b) A résumé was given by Mr. Henry Wood on the causes of the decline of the Scottish drift net fishery in July 1930, and on relationships between the trawl-caught herring of the Fladen Ground and the herring of the drift net grounds.

c) Prof. Ehrenbaum summarised the results of the age investigations carried out by Dr. Lissner on the German catches of herring by drift net and by herring trawl on the Fladen and Dogger Bank fishing grounds.

d) A report on investigations of the Fladen herring was made by Mr. J. le Gall.

e) Mr. Å. J. C. Jensen showed by means of charts the distribution of small herring larvae caught on the "Dana" Cruise in October 1930.

3) Haddock.

The Chairman made reference to the haddock forecast in the Administrative Report.

It was agreed that haddock scales be remitted to Scotland as previously.

4) Charts, showing a detailed survey of the Devil's Hole area by the British Admiralty survey ship "Fitzroy", were exhibited.

5) Dr. A. Bowman was re-elected Chairman for the ensuing year.

II. Recommendations.

1) Programme.

Cruises are projected by France and Germany to the Fladen Herring Grounds in August, and by Germany to the Dogger Bank area in September—October. Cruises in the Northern North Sea are projected by Sweden in June, and to the northern edge of the Dogger Bank by Scotland in September—October. Denmark is to carry on the survey of the eastern part of the Northern North Sea. The Scottish research vessel will be in commission for the greater part of the year and efforts will be made to increase our information, particularly in areas from which data are lacking.

2) It was recommended that notice of papers which it is desired should be read at the Council Meetings should be communicated to the Chairman in time for inclusion in the Agenda.

Southern North Sea Committee.

Chairman: Prof. W. Mielck.

The Committee met on March 26th, 1931, at 9.30 a.m.

I. Proceedings.

1) The proof prints of the Administrative Report, which it had not been possible to circulate beforehand, were laid before the Committee. The Report was adopted on the understanding that members will send corrections, if any, to the Chairman at the earliest possible time.

b) Un résumé est donné par M. Henry Wood sur les causes du déclin de la pêche Ecossaise au filet dérivant en Juillet 1930 et sur les relations du hareng chaluté du champ des Fladen avec le hareng des champs à filets dérivants.

c) Le Prof. Ehrenbaum résume les résultats des recherches sur l'âge conduites par le Dr. Lissner sur les captures Allemandes de harengs pris au filet dérivant et au chalut à hareng, sur les champs de pêche des Fladen et du Dogger Bank.

d) Un rapport concernant des investigations sur le hareng des Fladen est présenté par M. J. le Gall.

e) M. A. J. C. Jensen montre à l'aide de cartes la distribution des petites larves de hareng prises au cours de la croisière du Dana en Octobre 1930.

3) Aiglefin.

Le Président mentionne la prévision concernant l'aiglefin contenue dans le Rapport Administratif.

Il est convenu que des écailles d'aiglefin seront remises à l'Ecosse, comme précédemment.

4) Des cartes montrant les détails d'une inspection de l'aire du Devil's Hole exécutée par le Fitzroy, navire d'inspection de l'Amirauté Anglaise, sont exhibées.

5) Le Dr. A. Bowman est réélu Président pour l'année suivante.

II. Recommandations.

1) Programme.

Des croisières sont projetées par la France et par l'Allemagne sur les champs de pêche du hareng des Fladen en Août, et par l'Allemagne dans l'aire du Dogger Bank en Septembre—Octobre. Des croisières sont projetées dans le Nord de la Mer du Nord en Juin, par la Suède, et sur la limite septentrionale du Dogger Bank en Septembre—Octobre, par l'Ecosse. Le Danemark conduira l'inspection de la partie orientale du Nord de la Mer du Nord. Le navire de recherche Ecossais sera commissionné pendant la plus grande partie de l'année et des efforts seront faits pour accroître notre information particulièrement dans les aires au sujet desquelles les données font défaut.

2) Il est recommandé qu'une notice sur les communications dont on désire qu'il soit donné lecture aux réunions du Conseil soit remise au Président à temps pour pouvoir être incluse dans les Agenda.

Comité du Sud de la Mer du Nord.

Président: Prof. W. Mielck.
Le Comité se réunit le 26 Mars 1931 à 9h30 a.m.

I. Compte rendu.

1) Les épreuves du Rapport Administratif qu'il n'a pas été possible de distribuer préalablement, sont présentées au Comité. Le Rapport est adopté, mais il est entendu que les membres enverront au Président leurs corrections éventuelles le plus tôt possible.

2) The following scientific papers were read:—

Prof. LE GALL: Considérations sur la population harenguière en Manche orientale et à l'entrée sud de la Mer du Nord.

Dr. J. J. TESCH: Dutch investigations on the age of herring in recent years.

Prof. GILSON: The spent herring fishery in the coastal waters between Cape Grisnez and the Schelde.

3) The Committee considered that it would be most useful to combine in one report the information available on the action of saving trawls of various types, some of which is at present in print, some in typescript.

Mr. DAVIS kindly undertook to prepare a report on these lines.

4) Mr. DAVIS laid before the Committee the preliminary results of his inquiries into the size of cod-end meshes used in the trawling industry of the different countries.

He was asked to make his own arrangements for obtaining from the members such additional data as he may require to check his provisional conclusions.

5) The British Experts emphasised the necessity for plaice marking experiments on a large scale for the purpose of studying the growth rate, the rate of depletion by fishing, and the season and extent of offshore migrations. The Lowestoft Laboratory is prepared to undertake these experiments in the region from the Flemish Bight to Horns Reef. The undermentioned continental countries will deal with the evaluation of the stock of plaice on the eastern small plaice grounds: Germany, Holland, Belgium and to some extent Denmark.

6) With regard to forecasts of the plaice fisheries, the view is held that the fisheries are influenced not only by the age composition of the stock, but by several other factors, as, for example, annual variation of growth rate and rate of migration, which cannot at present be predicted.

7) The Committee considered the question put before them by the Consultative Committee, namely, whether standardisation of methods in the investigation of the cod was necessary and possible. The Committee was of opinion that the standardisation of methods would be very valuable.

8) The Committee approved the work and the proposals of the two Sub-Committees which met at Lowestoft in November and which were largely concerned with the work of this Committee.

9) Mr. DAVIS reported that the English Department was continuing to explore the possibilities of plaice transplantation to the Dogger Bank, especially with a view to engaging the support of the industry. He expressed the hope that all concerned will keep in mind the possibility of a large scale experiment in 1932. It was made clear that it could not be arranged for 1931.

Prof. MIELCK and Dr. TESCH stated that similar efforts were being made in their countries.

10) Prof. MIELCK was re-elected Chairman of the Committee.

2) Les mémoires scientifiques suivants sont lus:

M. LE GALL: Considérations sur la population harenguière en Manche orientale et à l'entrée de la Mer du Nord.

Le Dr. J. J. TESCH: Dutch investigations on the age of herring in recent years.

Le Prof. G. GILSON: The spent herring fishery in the coastal waters between Cape Grisnez and the Schelde.

3) Le Comité estime qu'il serait très utile de concentrer en un seul rapport toute l'information obtenue au sujet de l'effet des filets épargneurs de divers types, — une partie de cette information est aujord'hui imprimée, et le reste dactylographié.

M. DAVIS entreprendra obligeamment la préparation d'un rapport sur cette base.

4) M. DAVIS présente au Comité les résultats préliminaires de son enquête sur la grandeur des mailles de l'arrière-fond employées dans l'industrie chalutière de différents pays.

Il lui est demandé de s'arranger de manière à obtenir des membres les données complémentaires qu'il pourrait désirer pour vérifier ses conclusions provisoires.

5) Les Experts Britanniques insistent sur la nécessité de faire, sur une large échelle, des expériences de marquage de la plie dans le but d'étudier la rapidité de la croissance, la rapidité de l'épuisement par la pêche ainsi que la saison et l'extension des migrations à partir de la côte. Le laboratoire de Lowestoft est prêt à entreprendre ces expériences dans la région comprise entre la Mer de Flandre et Horns Reef. Les Pays continentaux ci-dessous indiqués s'occuperont de l'évaluation du stock de plies sur les fonds à jeunes plies de la côte orientale: l'Allemagne, les Pay Bas, la Belgique et, dans une certaine mesure, le Danemark.

6) Au sujet des prévisions pour les pêcheries de la plie, il est émis l'avis que ces pêcheries sont influencées non seulement par la composition du stock en fait de groupes annuels, mais encore par plusieurs autres facteurs, tels, par exemple, que la variation annuelle de la rapidité de la croissance et de l'extension de la migration, qui ne peuvent encore faire l'objet d'une »prédiction«.

7) Le Comité examine une question qui lui est soumise par le Comité Consultatif, à savoir: si la standardisation des méthodes d'investigation sur le cabillaud est nécessaire et possible. Le Comité est d'avis que la standardisation des méthodes serait très avantageuse.

8) Le Comité approuve le travail et les propositions des deux Sous-Comités qui se sont réunis à Lowestoft en Novembre et qui ont des rapports étroits avec le travail de ce Comité-ci.

9) M. DAVIS rapporte que le Département d'Angleterre continue à étudier les effets possibles de la transplantation de la plie au Dogger Bank, particulièrement en vue d'engager l'industrie à la soutenir. Il exprime l'espoir que ceux qui y ont de l'intérêt ne perdront pas de vue la possibilité de faire une expérience sur une large échelle en 1932. Il est établi qu'elle ne pourrait être organisée pour 1931.

Le Prof. MIELCK et le Dr. TESCH déclarent que des efforts dans le sens désiré sont faits dans leurs Pays.

10) Le Prof. MIELCK est réélu Président du Comité.

II. Recommendation.

It was recommended that each Expert should circulate as soon as possible the results of age determinations in herring to all experts engaged in these investigations, viz. M. le Gall, Prof. Gilson, Mr. Hodgson, Dr. Lissner and Dr. Tesch. It was made clear that such exchanged data should not be published except by permission of the worker who procured them.

Transition Area Committee.

Chairman: In place of Dr. Johansen who was prevented by illness from attending the meeting, Dr. Andersson was elected to the chair for this sitting.
The Committee met on March 24th, 1931, at 11.00 a.m.

I. Proceedings.

1) Haddock. Dr. Andersson spoke on the abundance of the different year classes of haddock in the Skagerrak and the northern Kattegat. Dr. Poulsen described the occurrence of haddock fry in the same area.
2) Plaice. The Chairman drew attention to the recently published report on the plaice investigations in the Transition Area.
3) Sprat. Dr. Molander spoke on the life history of the sprat in the Bohuslän fjords and on the Swedish Skagerrak coast. Dr. Poulsen drew attention to Dr. Johansen's paper on the sprat in the Limfjord.
4) Mackerel. Mr. Aage Jensen spoke on the influence of hydrographical factors upon the yield of the mackerel fishery in the sound. Dr. Fischer reported on the fluctuations in the German mackerel fishery in the Western Baltic.
5) *Pandalus borealis*. Dr. Andersson reported upon his studies of the occurrence of this shrimp in the Skagerrak.
6) Herring. Communications on the distribution of the larvae of the autumn spawning herring were made for the Baltic by Dr. Fischer and for the Kattegat and Belt Sea by Dr. Poulsen.
7) Witch. Dr. Molander spoke on the propagation of the witch in the northern Kattegat and the Skagerrak.
8) The Committee affirmed its interest in the report of work circulated on February 5th by the Office on the initiative of the Chairman of the Consultative Committee and expressed the desire that such reports be distributed every year.
9) The 1930 programme was re-adopted as a whole.
10) Dr. Johansen was re-elected Chairman for the ensuing year.

II. Recommandation.

Il est recommandé que chacun des experts communique le plus vite possible les résultats de ses déterminations d'âge du hareng à tous les autres experts engagés dans ces investigations, c'est-à-dire à M. LE GALL, le Prof. GILSON, M. HODGSON, le Dr. LISSNER et le Dr. TESCH. Il est décidé que de telles données réciproques ne devront être publiées qu'avec l'autorisation de celui qui les a procurées.

Comité du Secteur de Transition.

Président: en remplacement du Dr. JOHANSEN qu'une maladie empêche d'assister à la réunion, le Dr. ANDERSSON est appelé à la Présidence, pour cette session.
Le Comité se réunit le 24 Mars 1931, à 11h00 a.m.

1. Compte rendu.

1) Aiglefin. Le Dr. ANDERSSON parle de l'abondance des différentes classes annuelles dans le Skagerrak et le Cattégat septentrional. Le Dr. POULSEN d'écrit l'occurrence du fretin d'aiglefin dans la même aire.
2) Plie. Le Président attire l'attention sur le rapport récemment publié sur les recherches concernant la plie dans le Secteur de Transition.
3) Esprot. Le Dr. MOLANDER parle de la biologie de l'esprot dans les fjords du Bohuslän et sur la côte du Skagerrak Suédois. Le Dr. POULSEN signale à l'attention le travail du Dr. JOHANSEN sur l'esprot dans le Limfjord.
4) Maquereau. M. AAGE JENSEN parle de l'influence des facteurs hydrographiques sur le rendement de la pêche du maquereau dans le Sound. Le Dr. FISCHER fait rapport sur les fluctuations de la pêcherie Allemande du maquereau dans la Baltique occidentale.
5) *Pandalus borealis.* Le Dr. ANDERSSON fait rapport sur ses études de l'occurrence de cette crevette dans le Skagerrak.
6) Hareng. Des communications sur la distribution des larves de la ponte d'automne du hareng sont faites pour la Baltique par le Dr. FISCHER et pour le Cattégat et la Mer des Belts par le Dr. POULSEN.
7) Plie cynoglosse. Le Dr. MOLANDER parle de la reproduction de la plie cynoglosse dans le Cattégat septentrional et le Skagerrak.
8) Le Comité se déclare intéressé dans le rapport de travail distribué par le Bureau, le 5 février, à l'initiative du Président du Comité Consultatif, et exprime le désir que de tels rapports soient distribués chaque année.
9) Le programme de 1930 est réadopté dans son entier.
10) Le Dr. JOHANSEN est réélu Président pour l'année suivante.

Baltic Committee.

Chairman: Dr. K. A. Andersson.

The Committee met on March 24th, 1931, at 2.30 p.m. and on March 25th at 9. a.m.

I. Proceedings.

1) The Administrative Report was adopted.

2) Herring: Dr. Andersson demonstrated by means of diagrams the Swedish investigations on the age composition of the stock of herring and pointed out the possibilities of giving valuable predictions of the herring fishery in the Baltic. For that purpose he suggested that the countries bordering the Baltic should co-operate in studying the year-classes of the herring.

3) Salmonid fishes. Dr. Fischer gave an account of the salmon and sea trout fisheries on the German coast. The representatives of the different countries discussed the question of an international minimum size for the salmon in the Baltic. Mr. Borowik spoke on the stock of small salmon on the Polish coast; Dr. Järvi pointed out that it very seldom happened that a salmon smaller than 50 cm. was caught in Finnish waters.

It was considered desirable that the rate of growth of salmon should be more closely studied.

The Chairman suggested that each Baltic country should prepare a detailed report on the methods used in the salmon and sea trout fisheries in the Baltic, this report to include also analyses of the catches in the different types of gear. They should be laid before the Committee at its next meeting.

Dr. Poulsen reported on the salmon fisheries on the coast of Bornholm.

4) Flat fishes. Dr. Fischer described the mixture of the flounder, plaice and dab on the grounds in the southern Baltic; he also reported on the German marking experiments on the dab and the methods used for determining the age of this fish. Mr. Borowik presented a short summary of his paper: "The composition of the stock of flat fish in the Danzig Gulf" and proposed that a report should be published containing the general results of the flounder investigations carried out in the different Baltic countries.

Dr. Molander dealt with the Swedish investigations on the flounder in the Bornholm area and demonstrated that the rate of growth had increased during the last few years. In general the quality of catches of flounder was now higher than previously.

5) It was agreed that the question should be considered whether the investigations on the Baltic herring were so far advanced that the preparation of a report on this herring could be discussed at the next meeting.

6) The Committee affirmed its interest in the report of work circulated on February 5th by the Office on the initiative of the Chairman of the Consultative Committee and expressed the desire that such reports be distributed every year.

7) Dr. Andersson was re-elected Chairman for the ensuing year.

Comité Baltique.

Président: Dr. K. A. Andersson.
Le Comité se réunit le 24 Mars 1931, à 2h30 p.m. et le 25 Mars à 9h a.m.

I. Compte rendu.

1) Le Rapport Administratif est adopté.

2) Hareng. Le Dr. Andersson démontre à l'aide de diagrammes les recherches Suédoises sur la composition en classes annuelles du stock de harengs et fait remarquer qu'il pourrait être possible de donner des prédictions utiles à la pêcherie du hareng dans la Baltique. En vue de ce but il suggère que les Pays riverains de la Baltique coopèrent à l'étude des classes annuelles du hareng.

3) Poissons salmonides. Le Dr. Fischer donne un aperçu sur les pêcheries du saumon et de la truite de mer sur la côte Allemande. Les délégués des divers Pays discutent la question d'une taille minimale internationale pour le saumon dans la Baltique. M. Borowik parle du petit saumon sur la côte Polonaise. Le Dr. Järvi fait remarquer qu'il arrive très rarement qu'un saumon en dessous de 50 centimètres soit capturé dans les eaux Finlandaises.

Il est considéré comme désirable que la rapidité de la croissance du saumon soit étudiée de plus près.

Le Président suggère que chacun des Pays baltiques prépare un rapport détaillé sur les méthodes employées dans les pêcheries Baltiques du saumon et de la truite de mer et comprenant des analyses de captures faites avec différents types d'engin. Ces rapports devraient être présentés au Comité à sa prochaine réunion.

Le Dr. Poulsen fait rapport sur les pêcheries de saumon de la côte de Bornholm.

4) Poissons plats. Le Dr. Fischer décrit le mélange de flet, de plie et de limande qui peuple les fonds dans le Sud de la Baltique; il fait aussi rapport sur les expériences Allemandes de marquage de la limande et sur les méthodes employées pour la détermination de l'âge de ce poisson. Mr. Borowik présente un bref résumé de son travail: »The composition of the stock of flat fish in the Danzig Gulf« et propose qu'il soit publié un rapport contenant les résultats généraux des recherches sur le flet conduites dans les différents Pays Baltiques.

Le Dr. Molander traite des recherches Suédoises sur le flet dans la région de Bornholm et démontre que la rapidité de la croissance s'y est élevée pendant les quelques dernières années. En général la qualité des captures de flet est maintenant supérieure à ce qu'elle était précédemment.

5) Il est décidé qu'il y a lieu d'examiner si les investigations sur le hareng baltique sont assez avancées pour que la préparation d'un rapport sur ce hareng puisse être discutée à la réunion prochaine.

6) Le Comité se déclare intéressé dans le rapport de travail distribué par le Bureau, le 5 février, à l'initiative du Président du Comité Consultatif, et exprime le désir que de tels rapports soient distribués chaque année.

7) Le Dr. Andersson est réélu Président pour l'année suivante.

II. Recommendations.

1) The Committee decided to continue the programme adopted in 1930, laying special stress upon the following points: a) extensive marking experiments on the salmon and sea trout of different sizes: b) the preparation of reports by each country which should deal with the methods of capture of salmon and sea trout in the Baltic and should include analyses of the catches in the different types of gear.
2) It was recommended that a report should be prepared on the general results of the investigations on the Baltic flounder and that this report should be printed in the Rapports & Procès-Verbaux.

Combined Baltic and Transition Area Committees.

Chairman: Dr. K. A. Andersson.
The Committees met on March 25th, 1931, at 2.30 p.m.

I. Proceedings.

1) Dr. E. Fischer described investigations on the turbot in the German part of the Baltic.
2) Dr. H. Blegvad spoke on the determination of the age of the common dab, and
3) Dr. E. M. Poulsen on investigations on the racial characteristics of the cod in the Transition Area.
4) The damage done by seals was discussed; the general opinion was that this damage was increasing and that from the fisheries point of view it was desirable to regulate the number of seals in the Baltic.

II. Recommendation.

The Committee recommended that the investigations on the turbot should be continued.

II. Recommandations.

1) Le Comité décide de continuer le programme adopté en 1930 en insistant spécialement sur les points suivants: a) expériences très étendues de marquage du saumon et de la truite de mer, à différentes tailles; b) préparation dans chaque pays, de rapports traitant des méthodes de capture du saumon et de la truite de mer dans la Baltique et comprenant des analyses de captures faites avec différents types d'engin.
2) Il est recommandé qu'il soit préparé un rapport sur les résultats généraux des investigations sur le filet de la Baltique et que ce rapport soit imprimé dans les Rapports et Procès-Verbaux.

Comités Combinés de la Baltique et du Secteur de Transition.

Président: Dr. K. A. Andersson.
Le Comité se réunit le 25 Mars 1931 à 2h30 p.m.

I. Compte rendu.

1) Le Dr. E. Fischer décrit des investigations sur le turbot faites dans la partie Allemande de la Baltique.
2) Le Dr. H. Blegvad parle de la détermination de l'âge de la limande.
3) Le Dr. E. M. Poulsen parle des investigations sur les caractères raciques du cabillaud dans le Secteur de Transition.
4) Le dommage causé par les phoques est discuté. L'opinion générale est que ce dommage augmente, et qu'au point de vue des pêcheries il est désirable que le nombre des Phoques soit réglé, dans la Baltique.

II. Recommandation.

Le Comité recommande que les investigations sur le turbot soient continuées.

Programmes and Reports of other Committees.

Hydrographic Committee.

Chairman: Prof. M. KNUDSEN.

The Committee met on March 23rd, 1931, at 4 p.m. and on March 26th at 10.30 a.m.

I. Proceedings.

1) The participation of the Council in the investigations during the Polar Year 1932—33 was discussed and recommendation No. 1 was adopted.
2) A Report on the Bulletin Hydrographique and a set of the monthly offprints for the Bulletin as published for 1930 up to March 1st were laid before the Committee.
3) The elaboration of charts of isotherms and isohalines for the North Sea and the English Channel was discussed and recommendation No. 2, as proposed by the Sub-Committee concerned, was adopted.
4) The report from the Sub-Committee on internal waves in the Cattegat and in the Belts was discussed and the recommendations of the Sub-Committee were adopted. (Recommendation No. 3).
5) A summary report (prepared on the proposal of Mr. SUND last year) concerning the technique of surface sampling used in the various countries was laid before the Committee and discussed. Further consideration of this question was referred to a Sub-Committee consisting of MM. O. SUND (Chairman), J. P. JACOBSEN, J. R. LUMBY, D. J. MATTHEWS, P. M. VAN RIEL and B. SCHULZ.
6) The programmes from the different countries for the hydrographical investigations in the ensuing year were presented to the Committee.
7) In regard to the continuous current measurements from lightships in the Southern North Sea the Committee was informed that the work hitherto carried out would be continued and if possible extended.
8) The Committee was informed that MM. K. BUCH, H. W. HARVEY and H. WATTENBERG who form the working Committee for the investigation of carbonic acid factors in sea water were holding a meeting in Helsingfors and that the work was in progress but not yet finished.
9) The Committee was informed that Mr. MATTHEWS' tables for σ_t had not yet been completed. Recommendation No. 4 was adopted.
10) Prof. R. de BUEN raised the question of the rapid determination of salinity on board ship and suggested that it should be treated at the next Scientific Meeting. The matter was referred to a Sub-Committee consisting of MM. R. DE BUEN (Chairman), K. BUCH, J. GIRAL, H. W. HARVEY, J. R. LUMBY, B. SCHULZ and H. WATTENBERG.
11) The hydrographic questions to be treated at next year's Hydrographic Scientific Meeting were discussed. As regards the recommendation *vide* the report of this year's Hydrographic Scientific Meeting on page 100.
12) Mr. J. R. LUMBY suggested the preparation of a pamphlet describing the various

Programmes et Rapports des autres Comités.

Comité Hydrographique.

Président: Prof. M. Knudsen.
Le Comité se réunit le 23 Mars 1931 à 4h p.m. et le 26 Mars à 10h30 a.m.

I. Compte rendu.

1) La participation du Conseil aux investigations pendant l'Année Polaire 1932—33 est discutée et la recommandation No. 1 est adoptée.
2) Un rapport sur le Bulletin Hydrographique et une collection des tirés-à-part mensuels du Bulletin de 1930 publiés. jusqu'au 1 mars sont présentés au Comité.
3) L'élaboration de cartes d'isothermes et d'isohalines pour la Mer du Nord et la Manche est discutée et la recommandation No. 2 proposée par le Sous-Comité intéressé est adoptée.
4) Le rapport du Sous-Comité des vagues internes du Cattégat et des Belts est discuté et les recommandations du Sous-Comité sont adoptées. (Recommandation No. 3).
5) Un rapport sommaire (préparé sur la proposition de M. Sund l'année passée) au sujet de la technique de la prise d'échantillons de surface employée dans différents Pays, est présenté au Comité et discuté. Une considération ultérieure de cette question est confiée à un Sous-Comité composé de MM. O. Sund (Président), J. P. Jacobsen, J. R. Lumby, D. J. Matthews, P. M. van Riel et B. Schulz.
6) Les programmes pour les investigations hydrographiques de différents Pays pendant l'année prochaine, sont présentés au Comité.
7) Au sujet des mesures continues des courants à bord des bateaux-phare du Sud de la Mer du Nord, il est porté à la connaissance du Comité que le travail exécuté jusqu'ici sera continué et, si possible, étendu.
8) Il est annoncé au Comité que MM. K. Buch, H. W. Harvey et H. Wattenberg qui forment le Comité de travail chargé de l'investigation des facteurs de l'acide carbonique dans l'eau de mer sont réunis à Helsingfors et que leur travail est en bonne marche mais pas encore achevé.
9) Il est annoncé au Comité que les tables de M. Matthews pour σ_t n'ont pas encore été complétées. La recommandation No. 4 est adoptée.
10) Le Prof. R. de Buen soulève la question de la détermination rapide de la salinité à bord et suggère qu'elle devrait être traitée à la prochaine réunion scientifique. Le sujet est transmis à un Sous-Comité composé de MM. R. de Buen (Président), K. Buch, J. Giral, H. W. Harvey, J. R. Lumby, B. Schulz et H. Wattenberg.
11) Les questions hydrographiques qui feront le sujet de la Réunion Scientifique Hydrographique de l'année prochaine sont discutées. En ce qui concerne la recommandation, voir le rapport de la Réunion Scientifique Hydrographique de cette année, page 100.
12) M. J. R. Lumby propose la préparation d'une brochure décrivant les divers types

types of drift bottles in use. A Sub-Committee consisting of MM. A. Bowman (Chairman), R. de Buen, Ed. le Danois, J. P. Jacobsen, J. R. Lumby and B. Schulz was appointed to consider the matter.

13) Demonstrations and lectures during the meetings of the Hydrographic Committee:
a) Prof. G. Gilson exhibited a new insulated water-bottle.
b) Prof. A. Krogh and his assistant Dr. Ancel B. Keys demonstrated methods for the determination of chlorine and oxygen in small samples of sea water.
c) Prof. A. Defant gave a review of the results of the Meteor Expedition to the waters south of Iceland and Greenland.
d) Director P. M. van Riel gave a review of his Expedition in the "Snellius" to East Indian waters.

14) Prof. M. Knudsen was re-elected Chairman for the ensuing year.

II. Recommendations.

1) Investigations during the Polar Year 1932—33.

In view of the fact that in the Polar Year certain countries belonging to the Council are sending ships to make meteorological, magnetic and other observations in the polar regions, it was recommended that the opportunity be taken to obtain hydrographical observations during the voyages. As countries not connected with the Council are planning very extensive hydrographical work in the Polar Sea during the Polar Year, it was further recommended that every effort should be made by all countries adhering to the Council to extend their hydrographical work in that year.

2) Temperature and salinity charts for the North Sea and English Channel.
It was recommended that
a) the salinity and temperature charts should be published in a single atlas, together with summary tables.
b) a description of the methods used in elaborating the salinity normals for the North Sea should be published, and that this publication should contain the basic tables.
c) monthly means of temperature and salinity for the English Channel provided by Mr. J. R. Lumby should be combined with the North Sea material in the same charts.
d) the chart used for this purpose should be an equal-area azimuthal projection on a scale of about $1:4{\cdot}10^6$.

3) Investigations on submarine waves in the Cattegat and in the Belts.

It was recommended that the following programme submitted by the Sub-Committee be adopted.

The work in the southern Cattegat will be undertaken by the following countries:— Denmark, Finland and Sweden with one ship each, Germany with two. These ships will anchor at five positions in the southern Cattegat from the 10th to the 17th August 1931. During the period at anchor observations of the current, salinity and

de flotteurs en usage. Un Sous-Comité composé de MM. A. Bowman (Président), R. de Buen, Ed. le Danois, J. P. Jacobsen, J. R. Lumby et B. Schulz est nommé pour étudier la question.

13) Démonstrations et lectures au cours des réunions du Comité Hydrographique:
   a) Le Prof. G. Gilson exhibe une nouvelle bouteille à eau isolée.
   b) Le Prof. A. Krogh et son assistant Dr. Ancel B. Keys démontrent des méthodes pour la détermination du chlore et de l'oxygène dans de petits échantillons d'eau de mer.
   c) Le Prof. A. Defant présente une révision des résultats de l'expédition du Météor dans les eaux du Sud de l'Islande et du Groenland.
   d) Le Directeur van Riel présente un aperçu de son expédition à bord du »Snellius« dans les eaux des Indes Orientales.

14) Le Prof. M. Knudsen est réélu Président pour l'année suivante.

II. Recommandations.

1) Investigations pendant l'Année Polaire 1932—33.

Devant le fait que pendant l'Année Polaire certains Pays faisant partie du Conseil vont envoyer des navires pour faire des observations météorologiques, magnétiques et autres, dans les régions polaires, il est recommandé que l'on saisisse l'occasion d'obtenir des observations hydrographiques au cours des voyages. Puisque des Pays sans rapports avec le Conseil projettent des travaux hydrographiques très étendus dans la Mer Polaire, pendant l'Année Polaire, il est d'autant plus recommandé, que tous les Pays adhérents au Conseil fassent tous leurs efforts pour étendre leur travail hydrographique pendant cette année.

2) Carte des températures et des salinités pour la Mer du Nord et pour la Manche.
Il est recommandé
   a) que les cartes des salinités et des températures soient publiées en un seul atlas, en même temps que les tables sommaires.
   b) qu'une description des méthodes suivies dans l'élaboration des normales de salinité pour la Mer du Nord soit publiée et que la publication contienne aussi les tables de base.
   c) que les moyennes mensuelles de température et de salinité fournies par M. Lumby pour la Manche soient combinées avec le matériel de la Mer du Nord dans les mêmes cartes.
   d) que la carte employée pour cet usage soit une projection azimuthale à aire égale sur une échelle d'environ $1:4\cdot10^6$.

3) Investigations sur les vagues sous-marines dans le Cattégat et les Belts.

Il est recommandé que le programme suivant soumis par le Sous-Comité soit adopté.

Le travail dans le Sud du Cattégat sera entrepris par les Pays suivants: le Danemark, la Finlande et la Suède, — chaque Pays avec un navire, — l'Allemagne avec deux. Ces navires mouilleront en cinq positions dans le Cattégat méridional, du 10 au 17 Août 1931. Pendant la période passée à l'ancre, des observations de

temperature will be made at least every two hours at definite depths. In addition to this co-operative work the ships will concern themselves with individual studies of the position of the discontinuity layer, air temperature etc. Two days before and after the operation the hydrographical conditions both in the Cattegat and in the western Baltic will be studied by means of a series of hydrographical sections. Furthermore, the observations on the light-vessels Svinbådan, Fladen, Halskov Rev, Schultz's Grund and Anholt Knob will be extended and endeavours will be made to obtain water level measurements at Hesselø and at Halmstadt. The countries will make their own arrangements for carrying out their respective shares of the work.

4) Mr. MATTHEWS' tables of σ_t.

It was recommended that the tables of σ_t should be published when complete.

Plankton Committee.

The Committee met on March 26th, 1931, at 2.30 p.m.

In the absence of an elected Chairman Prof. HJORT opened the sitting and referred to the loss of the Chairman.

I. Proceedings.

1) Prof. GRAN was unanimously elected Chairman for this sitting.
2) Dr. JESPERSEN distributed advance copies of the 4th volume of the Résumé Planktonique prepared by the late Chairman.
3) Prof. MIELCK gave a summary of the experiments made to determine the relative catching power of different types of plankton nets. The Hensen net may be considered as furnishing a reliable standard of catching power.
4) On behalf of Mr. SAVAGE Mr. DAVIS reported that the International Standard Net had not been found satisfactory for plankton work in his area and asked for suggestions as to alternative types. He also reported on the programme for work at Lowestoft during the coming year, in which it was proposed (a) to locate possible concentrations of *Phaeocystis* or diatoms which might affect the migrations of herring, (b) to carry out a plankton survey of the middle North Sea for possible feeding grounds of herring.
5) Mr. FARRAN reported on his findings on the diurnal movements of plankton and larval fish.

II. Recommendations.

It was recommended that:—

1) It is of great importance that opportunity should be given for the plankton experts to discuss general problems and methods and that this Committee should continue to exist for that purpose.
2) In view of the lack of programme for future work, owing to the loss of the Chairman

courant, de salinité et de température seront faites au moins toutes les deux heures à des profondeurs déterminées. En dehors de ce travail coopératif les navires s'occuperont d'études individuelles sur la position de la couche de discontinuité, de la température de l'air, etc. — Deux jours avant et après l'opération, les conditions hydrographiques tant dans le Cattégat que dans la Baltique occidentale, seront étudiées à l'aide de séries de sections hydrographiques. En outre, des observations faites sur les bateaux-phare Svinbädan, Fladen, Halskov Rev, Schultz's Grund et Anholt Knob, seront étendues et des tentatives seront faites pour obtenir des mesures de niveau d'eau à Hesselo et à Halmstadt. Les Pays prendront leurs propres arrangements pour exécuter leurs parts respectives du travail.

4) Tables de σ_t de M. Matthews.

Il est recommandé que les tables de σ_t soient publiées aussitôt qu'elles seront achevées.

Comité du Plancton.

Le Comité se réunit le 26 Mars 1931 à 2h30 p.m.

En l'absence d'un Président nommé le Prof. Hjort ouvre la séance et rappelle la perte du Président.

I. Compte rendu.

1) Le Prof. Gran est élu unanimement Président pour cette session.
2) Le Dr. Jespersen distribue des épreuves provisoires du 4ième volume du Résumé Planctonique préparé par le Président défunt.
3) Le Prof. Mielck donne un résumé des expériences faites pour déterminer le pouvoir capturant relatif de différents types de filets à plancton. Le filet de Hensen peut être considéré comme fournissant un standard sûr du pouvoir capturant.
4) M. Davis, au nom de M. Savage, rapporte que le Filet Standard International n'a pas été trouvé satisfaisant pour le travail planctonique dans sa région. Il demande des suggestions au sujet d'autres types. Il fait rapport aussi sur le programme proposé à Lowestoft pour le travail pendant l'année prochaine. Il était proposé dans ce programme, (a) de déterminer la position de concentrations éventuelles de *Phaeocystis* ou de diatomées qui pourraient influencer les migrations du hareng, (b) de procéder à une inspection planctonique du milieu de la Mer du Nord, à la recherche de champs d'alimentation du hareng.
5) M. Farran présente des remarques sur ses trouvailles concernant les mouvements diurnes du plancton et des larves de poissons.

II. Recommandations.

Il est recommandé:

1) qu'il est d'une grande importance de donner aux experts de plancton l'occasion de discuter des problèmes généraux et des méthodes, et que ce Comité puisse continuer à exister dans ce but.
2) qu'en considération: (a) du manque de programme pour le travail futur, dû à la perte

and of the fact that one of the objects of the Committee, namely, the preparation of the Bulletin Planktonique, has just been completed, the Chairman should be requested to prepare by correspondence with the members a memorandum on the future work of the Committee, to be brought forward at the meeting of next year.

3) Prof. Mielck's investigations on the catching power of different types of nets should be continued for another year.

4) Quantitative investigations of the diurnal movements of plankton and larval fish should be carried out more extensively in waters of various depths, with especial relation to the thermocline when present.

Statistical Committee.

Chairman: Professor D'Arcy W. Thompson.
The Committee met at 4.30 p.m., on March 25th, 1931.

I. Proceedings:

1) The Bulletin for 1928, published shortly after the last Council Meeting, was laid on the table.

2) The Bulletin for 1929 was presented in MS., so far as completed, the material from Norway and Spain not having been received. The Chairman explained what changes had been made in this Bulletin in accordance with a resolution passed at last year's Committee Meeting: the most important change being a revised classification of the lists, formerly alphabetical, into groups, as follows: a) Herring and other pelagic fishes; b) Eel, Salmon and brackish-water fishes; c) Sea-fishes in general; d) Fish-livers; and e) Shellfish.

3) The Committee considered a motion proposed at Lowestoft in November 1930 by Mr. Atkinson, and remitted by the special Herring Committee, viz.:

That it is desirable that data with regard to the herring-fishery similar to those published in the Bulletin Statistique, Vol. I, should be made available, together with any additions which may be possible owing to the improvements that have been made in the collection of herring-statistics. That it is particularly desirable to shew the quantities landed from the different fishing-grounds, and also the relation between fishing-power expended and quantities taken.

4) On the motion of Dr. E. S. Russell, Professor D'Arcy W. Thompson was re-elected Chairman.

II. Recommendation:

The Committee recommended that the motion mentioned under 3) should be given effect to in the Bulletin for 1930, by publishing tables (so far as possible) of the monthly quantities of herring landed in the principal fishery districts, and by illustrating these by means of monthly charts, all as in the Bulletin Statistique, Vol. I.

du Président, (b) du fait que l'un des objets du Comité, — la préparation du Bulletin Planctonique, — vient d'être atteint, le Président actuel soit prié de préparer par correspondance avec les membres, un mémorandum sur le travail futur du Comité, à présenter à la réunion de l'année prochaine.

3) que les recherches du Prof. Mielck sur le pouvoir capturant de différents types de filets soient continuées pour une année.

4) que des investigations quantitatives sur les mouvements diurnes du plancton et des larves de poissons soient poursuivies avec plus d'extension dans des eaux de profondeur variée, particulièrement en relation avec le thermocline, quand il existe.

Comité Statistique.

Président: Prof. D'Arcy W. Thompson.
Le Comité se réunit le 25 Mars 1931 à 4h30 p.m.

I. Compte rendu.

1) Le Bulletin pour 1928, publié peu après la dernière réunion du Conseil est déposé sur la table.

2) Le Bulletin pour 1929 est présenté en MS — dans sa partie achevée, — le matériel de Norvège et d'Espagne n'étant pas encore arrivé. Le Président explique les changements qui ont été apportés à ce Bulletin en conformité avec une résolution prise à la réunion du Comité l'an dernier: le principal changement est une révision de la classification des listes, autrefois alphabétique, mais aujourd'hui répartie en groupes comme suit: a) Hareng et autre poissons pélagiques; b) Anguille, Saumon et poissons d'eau saumâtre; c) Poissons de mer en général; d) Foies de poissons, et e) Crustacés et mollusques.

3) Le Comité examine une motion faite à Lowestoft en Novembre 1930 par M. Atkinson et remise par le Comité spécial du hareng, à savoir:

Qu'il est désirable que des données concernant la pêcherie du hareng semblables à celles qui sont publiées dans le Bulletin Statistique, Vol. I, soient rendues accessibles, en même temps que toute addition qui pourrait devenir possible par suite des perfectionnements apportés à la réunion des statistiques du hareng, et qu'il est particulièrement à souhaiter que les quantités débarquées des divers champs de pêche soient indiquées ainsi que la relation entre la puissance de pêche dépensée et les quantités capturées.

4) Sur la proposition de Dr. E. S. Russell le Prof. D'Arcy W. Thompson est réélu Président.

II. Recommandation.

Le Comité recommande que la motion mentionnée au No. 3 soit mise en vigueur dans le Bulletin pour 1930 par la publication (pour autant que ce soit possible), des quantités de hareng débarquées mensullement dans les principaux districts de pêcherie, et en illustrant celles-ci à l'aide de cartes mensuelles, tout comme dans le Bulletin Statistique, Vol. I.

Limnological Committee.

(Now: **Salmon and Trout Committee**).

The Committee met on March 24th at 10 a.m. and on March 26th at 9.30 a.m. and 3.30 p.m.

I. Proceedings.

1) The President of the Council took the chair. On behalf of the Bureau he asked the Committee to consider whether it should continue to exist or whether its functions should be transferred to the Area Committees or to special meetings.

2) Professor M. Siedlecki was elected Chairman and took the chair. He referred to the important work done by Prof. Henking, the late Chairman, for limnology and for science in general. At his proposal a telegram was sent to Prof. Henking thanking him for his greatly valued assistance to the Committee.

3) Dr. W. Schnakenbeck, Prof. A. Willer and Dr. Nils Rosén were nominated as members of the Committee.

4) The statistics of the catch of salmon and sea trout in 1930 and the age composition in various countries were discussed.

5) Dr. E. Fischer discussed the material collected by Prof. Henking for Part 3 of his Report on the Salmonidae, dealing with the Laws and Regulations governing the Salmon and Sea Trout fisheries in the various participating countries. It was decided to supplement the material with the reports from France, the Netherlands and Spain and to hand the papers to the British Ministry of Agriculture and Fisheries where a summary for discussion at the next meeting would be prepared.

6) The following communications were made:—
Mr. R. Southern on the food of brown trout in Irish rivers.
Prof. Willer on investigations of the Baltic salmon made in East Prussia.
Prof. T. H. Järvi on marking experiments especially by means of loose hooks.
Mr. W. J. M. Menzies on the food of adult sea trout.
Mr. R. Southern on the growth of brown trout in Ireland in relation to the p_H of the water in which they live.
Dr. E. Fischer on experiments begun by Prof. Henking on the effects of transplanting small brown trout from fresh water to the Baltic.
Dr. E. M. Poulsen on the growth of some Danish sea trout.
Mr. J. Borowik on races of Polish sea trout.
Mr. W. J. M. Menzies on the study of furunculosis carried out during the past year in Scotland.

7) A discussion was initiated by Mr. W. J. M. Menzies on the difficulties in the correct interpretation of sea trout scales.

8) Prof. Siedlecki was re-elected Chairman for the ensuing year.

II. Recommendations.

1) As regards point 1) of these Proceedings the Committee considered that its existence should be continued and gave the reasons for continuation as follows:—

Comité Limnologique.

(Aujourd'hui: **Comité du Saumon et de la Truite**).

Le Comité se réunit le 24 Mars à 10h a.m. et le 26 Mars à 9h30 a.m. et 3h30 p.m.

I. Compte rendu.

1) Le Président du Conseil occupe la chaise. Il demande, de la part du Bureau, si le Comité estime qu'il doit continuer à exister ou si sa fonction pourrait être transférée aux Comités des secteurs ou à des réunions spéciales.
2) Le Prof. Siedlecki est élu Président et prend la chaise. Il rappelle le travail important accompli par le Prof. Henking, le dernier Président, pour la limnologie et pour la science en général. Sur sa proposition, un télégramme est envoyé au Prof. Henking pour le remercier de son assistance au Comité, hautement appréciée.
3) Le Dr. H. Schnakenbeck, le Prof. Willer et le Dr. Nils Rosén sont nommés Membres du Comité.
4) Les statistiques de la capture du saumon et de la truite de mer en 1930 et sa composition en classes d'âge dans divers pays, sont discutées.
5) Le Dr. Fischer discute le matériel réuni par le Prof. Henking pour la Partie 3 de son Rapport sur les Salmonides, en traitant des Lois et Réglements régissant les pêcheries du Saumon et de la Truite de mer dans les divers pays participants. Il est décidé de compléter le matériel par les rapports de France, des Pays-Bas et d'Espagne et de passer les documents au Ministère Anglais de l'Agriculture et des Pêcheries, où un sommaire pourra être préparé pour la réunion prochaine.
6) Les communications suivantes sont faites:
   M. R. Southern, sur la nourriture de la truite brune dans les rivières d'Irlande.
   Le Prof. Willer, sur des investigations sur le saumon Baltique faites en Prusse Orientale.
   Le Prof. Järvi sur des expériences de marquage spécialement à l'aide de hameçons libres.
   M. W. J. M. Menzies, sur la nourriture de la truite de mer adulte.
   M. R. Southern, sur la croissance de la truite brune en Irlande en relation avec le p_H de l'eau dans laquelle elle vit.
   Le Dr. Fischer, sur des expériences commencées par le Prof. Henking sur les effets de la transplantation de la petite truite brune de l'eau douce dans la Baltique.
   Le Dr. E. M. Poulsen, sur la croissance de quelques truites de mer Danoises.
   M. J. Borowik, sur des races de la truite de mer Polonaise.
   M. W. J. Menzies, sur l'étude de la furonculose faite pendant l'année passée en Ecosse.
7) Une discussion suscitée par M. W. J. M. Menzies se produit au sujet de la correcte interprétation des écailles de la truite de mer.
8) Le Prof. Siedlecki est réélu Président pour l'année suivante.

II. Recommandations.

1) Au sujet du point 1 de ce Compte rendu, le Comité estime que son existence doit être continuée et donne pour cette continuation les raisons suivantes:

a) The chief value of the Limnological Committee, so far as salmon and trout are concerned, is that it permits an intimate and immediate comparison of knowledge obtained from the investigation of these fish in all countries.

b) This comparison helps each investigator to decide what phenomena are the results of conditions peculiar to his own country and what are the results of widespread causes affecting large areas.

c) The meetings of the Limnological Committee afford opportunities of comparing the methods employed in all investigations of salmon and trout and of estimating their value.

d) The investigation of the salmon during its feeding and growth in the sea is only possible at present in the Baltic area and those investigators from non-Baltic countries attach great importance to the opportunities afforded by the meetings of the Limnological Committee for discussions on the sea life of the salmon.

e) Salmon and sea trout are not limited to any particular area but are almost of equal importance from the Arctic to the south-west of England and the south of Ireland; their total range extends even further south. Division of any investigations or consideration of their life history among a number of Area Committees would prevent a clear view of the whole field and would not be conducive to co-operative work or to the possibility of co-operative programmes among all those interested.

f) Investigation of the problems presented by salmon and sea trout is largely in the hands of specialists and would inevitably and necessarily be relegated to a very minor position were it dealt with by those whose chief concern is in the marine food fishes.

g) It is suggested that the name of the Committee should be changed to "The Salmon and Trout Committee". Matters dealing with any other anodromous or brackish water fish should be dealt with by this Committee.

This reply to the Bureau of the Council was approved.

2) The following programme of investigations for the ensuing year was adopted:—

Salmon and Sea Trout:—

a) Study of the rate of growth of different stocks.

b) Study of the migrations.

c) Study of the food in the sea.

d) Collection of statistics on the age composition of the annual catch.

3) It was recommended that the Sub-Committee appointed for the study of the salmon in the area between Great Britain, Ireland, France and Spain be asked to continue its work with Prof. Roule as Chairman.

a) La principale utilité du Comité Limnologique, pour ce qui concerne le saumon et la truite, est qu'il permet une comparaison intime et immédiate des connaissances obtenues par l'investigation sur ces poissons dans tous les pays.

b) Cette comparaison aide chacun des investigateurs à décider quels sont les phénomènes qui résultent de conditions particulières à son propre pays et quels sont les résultats de causes très étendues affectant de larges aires.

c) Les réunions du Comité Limnologique fournissent l'occasion de comparer les méthodes employées dans toutes les recherches sur le saumon et la truite et de juger de leur valeur.

d) L'investigation sur le saumon pendant sa période d'alimentation et de croissance en mer n'est possible aujourd'hui que dans le secteur Baltique, et les investigateurs des pays non-Baltiques attachent une grande importance aux occasions fournies par les réunions du Comité Limnologique de discuter sur la vie marine du saumon.

e) Le saumon et la truite ne sont pas limités à une région particulière, mais ont à peu près la même importance depuis la région Arctique jusqu'au Sud-Ouest de l'Angleterre et au Sud de l'Irlande et leur distribution totale s'étend même plus loin au Sud. La division des investigations ou études de leur biologie entre un certain nombre de Comités de Secteurs empêcherait l'obtention d'une vue claire de tout le champ de recherche et ne conduirait ni à du travail coopératif ni à l'élaboration de programmes entre les intéressés.

f) L'investigation des problèmes présentés par le saumon et la truite de mer est surtout aux mains de spécialistes et elle serait nécessairement et inévitablement réduite à une position très inférieure si elle était traitée par ceux pour lesquels l'affaire principale est l'étude des poissons alimentaires marins.

g) Il est proposé que le nom du Comité soit changé en »Comité du Saumon et de la Truite«. Les questions ayant des rapports avec tous les autres poissons anadromes ou d'eau saumâtre seraient traitées par ce Comité.

Cette réponse au Bureau du Conseil est approuvée.

2) Le programme des investigations pour l'année suivante est adopté:

Saumon et Truite de mer:

a) Etude de la rapidité de la croissance dans des stocks divers.

b) Etude sur les migrations.

c) Etude de la nourriture en mer.

d) Réunion de données statistiques sur la composition de la capture annuelle en classes d'âge.

3) Il est recommandé que le Sous-Comité nommé pour l'étude du saumon dans le secteur compris entre la Grande Bretagne, l'Irlande, la France et l'Espagne soit prié de continuer son travail, avec le Prof. Roule comme Président.

Whaling Committee.

Chairman: Professor JOHAN HJORT.

The Committee met at 10. a.m. on March 24th, 1931.

I. Proceedings.

1) The Chairman briefly reviewed the present situation of the whaling industry and said that the catches in the Antarctic, which were made further to the east than last year, had been excellent, but the effect was such an accumulation of oil that the owners of whaling boats — according to the press — had decided to lay up for next year.

The Committee decided, in the light of this information, to postpone any discussion of the whaling situation.

At the suggestion of the Chairman a telegram was sent to Konsul Lars Christensen, Sandefjord, to congratulate him and the crew on the conclusion of the "Norvegia"s circumnavigation of the Antarctic continent.

2) International Whaling Statistics. The Chairman referred to the first issue of the statistics which had been sent to the members and to the arrangements for the next issue, suggested by Mr. RISTING (letter appended, Appendix Nr. 1).

The Committee expressed its satisfaction with the statistics published and confirmed its interest in the work as a whole. Promises were made to obtain further data.

3) The draft convention for the regulation of whaling proposed by a Committee of Experts in Berlin 1930 (see Appendix Nr. 2).

The Chairman informed the members that an amendment to this draft convention had been put forward by the Canadian Government (see App. Nr. 3), which the Norwegian Government would undoubtedly be willing to adopt. It is satisfactory that this convention followed the lines of the proposals put forward at the meeting held by the International Whaling Committee in Paris in 1927.

4) Prof. HJORT was re-elected Chairman for the ensuing year.

Appendix No. 1.

(Letter from S. RISTING to JOHAN HJORT, dated Sandefjord, 3rd March, 1931).

The new publication on "International Whaling Statistics" will describe the material available and the method of collection which has been followed. It will also contain a short historical account of the development of modern whaling from the time when SVEN FOYN began whaling in 1868. This historical account will contain as far as possible detailed statistics of the number of whales (distinguishing, if possible, the different kinds) which have been caught on each whaling ground in the North Atlantic in past years. These statistics I hope to make fairly complete, by detailing the numbers of whales taken, of barrels of oil produced, and of whaling boats used at each of the following grounds — Northern Norway, Iceland, Faroe Islands, Shetlands, Hebrides, west coast of Greenland, Svalbard, Murman Coast and Newfoundland — up to 1910 when the main

Comité de la Baleine.

Président: Prof. Johan Hjort.
Le Comité se réunit 24 Mars 1931 à 10h a.m.

I. Compte rendu.

1) Le Président donne un bref aperçu de la situation présente de l'industrie baleinière et dit que les captures dans l'Antarctique, qui ont été faites plus loin vers l'est que l'année passée, ont été excellentes, mais qu'elles ont produit une telle accumulation d'huile que les propriétaires de navires baleiniers, — d'après la presse, — ont décidé de chômer l'année prochaine.

Le Comité, à la lumière de cette information, décide de différer toute discussion sur la situation baleinière.

Sur la proposition du Président, un télégramme est envoyé au Consul Lars Christensen, à Sandefjord, pour le féliciter, lui et son équipage, au sujet de l'accomplissement de la circumnavigation du Continent Antarctique par le »Norvegia«.

2) Statistique Internationale de la Baleine. Le Président signale la première publication de la statistique, qui a été envoyée aux membres, ainsi que les arrangements pour la publication suivante proposés par Mr. Risting (une lettre est annexée, Appendice No. 1).

Le Comité exprime sa satisfaction au sujet de la statistique publiée et confirme l'intérêt qu'il prend au travail dans son ensemble. Des promesses sont faites pour l'obtention de données ultérieures.

3) Projet d'une Convention destinée à réglementer la chasse à la baleine proposée par un Comité d'Experts, à Berlin en 1930 (voir Appendice No. 2).

Le Président fait connaître aux membres qu'un amendement à cette Convention a été proposé par le Gouvernement Canadien (voir Appendice No. 3), — amendement que le Gouvernement Norvégien sera certainement disposé à adopter. Il est satisfaisant que cette Convention s'inspire des propositions formulées à la réunion tenue par le Comité International de la Baleine, à Paris, en 1927.

4) Le Prof. Hjort est réélu Président pour l'année suivante.

Appendice No. 1.

(Lettre de S. Risting à Johan Hjort, datée de Sandefjord, 3 Mars 1931.)

La nouvelle publication sur »la Statistique Internationale de la Baleine« décrira les matériaux disponibles et la méthode qui a été suivie dans leur réunion. Elle contiendra aussi un court aperçu historique du développement de la chasse à la baleine moderne, depuis le temps où Sven Foyn commença à la pratiquer, en 1868. Cet aperçu historique contiendra, pour autant que la chose soit possible, des statistiques détaillées concernant le nombre de baleines capturées sur chacun des champs de chasse de l'Atlantique Nord, pendant les années passées, en distinguant, si possible, les différentes espèces. J'espère rendre ces statistiques assez complètes, en détaillant les nombres de baleines capturées, de tonneaux d'huile produite et de navires baleiniers employés sur chacun des champs suivants: Norvège septentrionale, Islande, Iles Faroe, Shetlands, Hebrides, Côte Ouest

compilation of systematic statistics began. It will, however, be difficult for me to procure the necessary figures from East Asia from the beginning of modern whaling there.

For the season 1909—10 there will be comprehensive statistics similar to those which were published last year. As you will remember, the intention in this case is to reprint the statistics which we issued last year for the period 1919—1929, so that the whole statistics for modern whaling may be available in one number.

Further, the number will contain complete statistics of the whaling season 1929—30 and the summer season 1930. This may be called the technical side of the statistics.

Further, we agreed that the statistics should also give an account of the way in which the animals caught are utilized, stating for each company the number of barrels of oil produced per calculated blue whale.

Similarly we agreed that there should be particulars of the dimensions (length) of the whales on the different whaling grounds. I will therefore give the average length of the animals caught by each company, specifying the different kinds. Then the larger areas will be combined to obtain the average size of the animals caught over this wider area. In this, however, the companies will be distinguished by numbers instead of names in all the tables.

This is roughly the plan I intend to follow and, as you will see, it is in accordance with the agreements we reached in your office on February 16th.

I expect that so far as I am concerned, all the work will be finished by about the end of May.

Appendix No. 2.

League of Nations.

Economic Committee.

Report to the Council on the Work of the thirty-second Session.

Held at Geneva from June 2nd to 6th, 1930.

VI. Riches of the Sea (Protection of Whales).

In pursuance of the decision taken by the Economic Committee at its twenty-ninth session (July 1929), a Committee of Experts[1]) met at Berlin on April 3rd, 1930.

[1]) Members of this Committee were:

M. A. Hodt, Hamburg.

E. R. Darnley, Colonial Office, London.

J. O. Borley, O.B.E., Fisheries Adviser, Colonial Office, London.

Dr. Remington Kellogg, National Museum, Washington.

Professor Ed. le Danois, secrétaire général de la Commission de la Méditerranée, directeur de l'Office scientifique et technique des Pêches maritimes, Paris.

M. Ohta, expert attaché à la Section de la pêcherie du Ministère de l'Agriculture et de la Forêt, Tokio.

Professor J. Hjort, de l'Université, Oslo.

Dr. A. de Magalhaes Ramalho, directeur de l'Acquarium Vasco da Gama, Lisbon.

du Groenland, Svalbard, Côte de Murman et Terre Neuve, - jusqu'en 1910, lorsque s'établit la principale compilation des statistiques systématiques. Il sera, toutefois, difficile de me procurer les chiffres nécessaires concernant l'Asie orientale depuis le début de la chasse à la baleine moderne dans cette région.

Pour la saison 1909—10, il y aura une statistique étendue, semblable à celle qui a été publiée l'an dernier. Ainsi que vous vous le rappelez, notre intention dans le cas présent est de réimprimer les statistiques que nous avons publiées l'an dernier pour la période 1919—1929, de telle sorte que l'on disposera en un seul volume, de toute la statistique de toute l'industrie baleinière moderne.

De plus, le numéro contiendra la statistique complète de la saison baleinière 1929—30 et de la saison d'été de 1930. Ceci peut être appelé le côté technique de la statistique.

En outre, nous avons résolu que la statistique donnera aussi un aperçu sur la manière dont les animaux capturés sont utilisés, en donnant pour chaque compagnie le nombre de barils d'huile produits par baleine bleue calculée. De même, nous avons décidé qu'il y aura des détails au sujet des dimensions (longueur) des baleines sur les différents champs de chasse. Je donnerai donc la longueur moyenne des animaux capturés par chaque compagnie en indiquant les différentes espèces. Ensuite on combinera des aires plus grandes afin d'obtenir la taille moyenne des animaux capturés sur ces plus larges surfaces. Dans celles-ci cependant les compagnies seront indiquées dans toutes les tables par des numéros au lieu des noms.

Voilà, en gros, le plan que j'ai l'intention de suivre, et, comme vous le voyez, il est conforme aux accords auxquels nous sommes arrivés, dans votre bureau le 16 Février.

J'estime que, pour ce qui me concerne, le travail sera terminé vers la fin de Mai.

Appendice No. 2.

Société des Nations.

Comité Économique.

Rapport au Conseil sur les Travaux de la trente-deuxième Session.

Tenue à Genève du 2 au 6 juin 1930.

VI. Richesses de la Mer (Protection de la Baleine).

Conformément à la décision prise par le Comité économique au cours de sa vingt-neuvième session (juillet 1929), une Commission d'experts[1]) a été convoquée à Berlin, le 3 avril 1930.

[1]) Cette Commission était composée comme suit:

M. A. Hodt, Hambourg.

E. R. Darnley, Colonial Office, London.

J. O. Borley, O.B.E., Fisheries Adviser, Colonial Office, London.

Dr. Remington Kellogg, National Museum, Washington.

Professeur Ed. Le Danois, secrétaire général de la Commission de la Méditerranée, directeur de l'Office scientifique et technique des Pêches maritimes, Paris.

M. Ohta, expert attaché à la Section de la pêcherie du Ministère de l'Agriculture et de la Forêt, Tokio.

Professeur J. Hjort, de l'Université, Oslo.

Dr. A. de Magalhaes Ramalho, directeur de l'Acquarium Vasco da Gama, Lisbonne.

In pursuance of the above-mentioned decision of the Economic Committee, the experts were requested to consider more particularly "whether and in what terms, for what species and in what areas, international protection of marine fauna could be established".

The experts unanimously agreed that it would be possible to help the whaling industry by means of an international convention.

After studying the Norwegian Law, which came into force on June 21st, 1929, a Royal Decree dated August 2nd, 1929, of notification by the Ministry of Commerce dated July 4th, as well as proposals submitted by some of the experts, the experts drew up a statement of certain principles and of certain rules which they submitted to the Economic Committee in the form of a draft convention.

The Committee, with the assistance of the Legal Section, introduced certain modifications in the draft, particularly in regard to the formal clauses. The modified text is attached herewith.

The Committee, after reviewing the position, proposes that the Council should transmit this text to the various Governments in order to obtain their views thereon.

It would seem expedient to wait until the replies have been received from the Governments before considering the desirability of convening a conference at some future date or of simply opening, during one of the forthcoming Assemblies, a protocol for signature by any States wishing to become parties thereto.

Annex.

Preliminary Draft Convention for the Regulation of Whaling.

Article 1.

The High Contracting Parties undertake to take, within the limits of their respective jurisdictions, appropriate measures to ensure the application of the provisions of the present Convention and the punishment of infractions of the said provisions.

Article 2.

The present Convention applies only to baleens or whalebone whales.

Article 3.

The taking or killing of right whales, which shall be deemed to include North Cape whales, Greenland whales, Southern right whales, Pacific right whales and Southern Pigmy right whales, is prohibited.

Article 4.

The taking or killing of calves or suckling whales, immature whales and female whales which are accompanied by calves or suckling whales, is prohibited.

D'après la décision susmentionnée du Comité économique, les experts étaient spécialement invités à examiner »si et dans quels termes, dans quels parages, une protection internationale des baleinoptères pourrait être établie«.

Les experts ont reconnu, à l'unanimité, qu'il serait possible d'aider l'industrie baleinière au moyen d'une convention internationale.

Après avoir étudié une loi norvégienne mise en vigueur le 21 juin 1929, un décret royal du 2 août 1929 et des notifications du Ministère du Commerce en date du 4 juillet, ainsi que des propositions présentées par quelques-uns des experts, ces derniers ont abouti à la compilation de certains principes et de certaines règles qu'ils ont présentés aux Comité économique sous la forme d'un projet de convention.

Le Comité, avec le concours de la Section juridique, a apporté à ce projet certaines modifications, notamment en ce qui concerne les stipulations d'ordre protocolaire. Le texte ainsi modifié est ci-joint.

Le Comité, après avoir examiné la situation, propose au Conseil de transmettre ce texte aux différents gouvernements, en vue de recueillir leurs observations.

Il semble prudent de remettre, jusqu'au moment où les réponses des gouvernements auront été obtenues, l'examen de la question de savoir s'il conviendrait de convoquer, le moment venu, une conférence internationale, ou, au contraire, d'ouvrir simplement, au cours de l'une des prochaines Assemblées, un protocole à la signature des Etats qui voudraient en devenir parties.

Annexe.

Avant-Projet d'une Convention destinée à réglementer la Chasse à la Baleine.

Article premier.

Les Hautes Parties contractantes s'engagent à prendre, dans les limites de leurs juridictions respectives, des mesures appropriées pour assurer l'application des dispositions de la présente Convention et pour punir les infractions auxdites dispositions.

Article 2.

La présente Convention est applicable seulement aux baleines à fanons.

Article 3.

Il est interdit de capturer ou de tuer les »right whales«, qui seront considérées comme comprenant la baleine du Cap Nord, la baleine du Groenland, la »right whale« australe, la »right whale« du Pacifique et la »right whale« pygmée australe.

Article 4.

Il est interdit de capturer ou de tuer les baleineaux ou jeunes baleines non sevrées, les baleines non adultes et les baleines femelles accompagnées de baleineaux ou de jeunes non sevrés.

Article 5.

The fullest possible use shall be made of the carcases of whales taken. In particular:

1) There shall be extracted by boiling or otherwise the oil from all blubber and from the head and the tongue and, in addition, from the tail as far forward as the outer opening of the lower intestine.

The provisions of this sub-paragraph shall apply only to such carcases or parts of carcases as are not used for human food.

2) Every factory, whether on shore or afloat, used for treating the carcases of whales shall be equipped with adequate apparatus for the extraction of oil from the blubber, flesh and bones.

3) In the case of whales brought on shore adequate arrangements shall be made for utilising the residues after the oil has been extracted.

Article 6.

Gunners and crews of whaling boats shall be engaged on terms such that their remuneration shall depend to a considerable extent upon such factors as the size, species, value and yield of oil of whales taken and not merely upon the number of whales taken, in so far as payment is made dependent on results.

Article 7.

No vessel of the High Contracting Parties shall engage in taking or treating whales unless a licence authorising such vessel to engage therein shall have been granted in respect of such vessel by the High Contracting Party to which she belongs or unless her owner or charterer has notified his Government of his intention to employ her in whaling and has received a certificate of notification from the said Government.

Nothing in this article shall prejudice the right of any High Contracting Party to require that in addition a licence shall be required from his own authorities by every vessel desirous of using his territory or territorial waters for the purposes of taking or treating whales, and such licence may be subject to such conditions as may be deemed by such High Contracting Party to be necessary or desirable, independent of the nationality of the vessel.

Article 8.

The geographical limits within which the articles of this Convention are to be applied, shall include all the waters of the world, including both the high seas and territorial and national waters.

Article 9.

The High Contracting Parties shall obtain with regard to their vessels engaged in the taking of whales information comprising the following particulars with regard to each whale taken:

Article 5.

Les carcasses des baleines capturées devront être utilisées aussi complètement que possible. En particulier:

1) L'huile devra être extraite, par ébullition ou par tout autre procédé, de tout le blanc, de la tête et de la langue et, en outre, de la queue jusqu'à l'ouverture extérieure du gros intestin.

Les dispositions du présent paragraphe ne seront applicables qu'aux carcasses ou parties de carcasses non comestibles.

2) Toute usine, flottante ou non, servant à traiter les carcasses de baleine, devra être munie de l'outillage nécessaire pour extraire l'huile du blanc, de la chair et des os.

3) Si des baleines sont amenées au rivage, des mesures appropriées devront être prises pour utiliser les résidus après l'extraction de l'huile.

Article 6.

Les canonniers et les équipages des navires baleiniers devront être embauchés à des conditions qui feront, dans une grande mesure, dépendre leur rémunération de facteurs tels que la taille, l'espèce, la valeur des baleines capturées et la quantité d'huile extraite, et non pas seulement du nombre des baleines capturées, pour autant que cette rémunération dépende des résultats de la chasse.

Article 7.

Aucun navire des Hautes Parties contractantes ne pourra se livrer à la capture ou au traitement des baleines sans qu'une licence spéciale ait été concédée à ce navire par la Haute Partie contractante à laquelle il appartient, ou sans que son propriétaire ou affréteur ait notifié à son gouvernement son intention d'utiliser ce navire pour la chasse à la baleine et qu'il ait reçu dudit gouvernement une attestation de cette notification.

Le présent article ne porte nullement atteinte au droit, pour l'une quelconque des parties contractantes, d'exiger, en outre, une licence émanant de ses propres autorités, pour tout navire désireux d'utiliser son territoire ou ses eaux territoriales en vue de capturer ou de traiter des baleines. La délivrance de cette licence pourra être subordonnée aux conditions que la Haute Partie contractante intéressée estimera nécessaires ou opportunes, quelle que soit la nationalité du navire.

Article 8.

La zone géographique d'application des articles de la présente Convention s'étendra à toutes les eaux du monde entier, y compris à la fois la haute mer et les eaux territoriales et nationales.

Article 9.

Les Hautes Parties contractantes devront obtenir de leurs navires baleiniers des renseignements sur chaque baleine capturée, en ce qui concerne les points suivants:

1) Date of taking;
2) Place of taking;
3) Species;
4) Sex;
5) Length measured when taken out of water; estimated, if cut up in water;
6) When fœtus is present, length and sex if ascertainable;
7) Where practicable, information as to stomach contents.

Protocol ad 5 of Article 9.

The length referred to in sub-paragraphs 5 and 6 of Article 9 shall be the length of a straight line taken from the tip of the snout to the notch between the flukes of the tail.

Article 10.

Each High Contracting Party shall obtain from all factories, on land or afloat, under their jurisdiction, returns of the number of whales of each species treated at each factory and of the amounts of oil of each grade and the quantities of meal, guano and other products derived from them.

Article 11.

Each of the High Contracting Parties shall communicate statistical information regarding all whaling operations under their jurisdiction to a body which shall be established in order to collect and distribute statistics of whaling. The information given shall comprise at least the particulars mentioned in Article 10 and: 1) The name and tonnage of each floating factory; 2) The number and aggregate tonnage of the whale catchers; 3) A list of the land stations which are in operation during the period concerned.

Such information shall be given at convenient intervals not longer than one year.

Article 12.

The present Convention shall remain open until the ..... 19.., for signature on behalf of any Member of the League of Nations or of any non-Member State (invited to the Conference or)[1]) to which the Council of the League of Nations has communicated a copy of the Convention for this purpose.

Article 13.

The present Convention is subject to ratification. Ratifications shall be deposited with the Secretariat of the League of Nations.

The Secretary-General shall give notice of the deposit of each ratification to the Members of the League of Nations and to the non-Member States mentioned in Article 12, indicating the date of its deposit.

[1]) Words in brackets will not be appropriate if the Convention is drawn up at the Assembly.

1) Date de la capture;
2) Lieu de la capture;
3) Espèce;
4) Sexe;
5) Longueur mesurée si l'animal est retiré de l'eau; approximative, si la baleine est découpée dans l'eau;
6) S'il y a un fœtus, longueur du fœtus et son sexe, s'il peut être déterminé;
7) Renseignements sur le contenu de l'estomac, lorsque cela est possible.

Protocole ad 5 de l'article 9.

La longueur mentionnée aux paragraphes 5 et 6 de l'article 9 sera celle de la ligne droite depuis l'extrémité du museau jusqu'à l'intersection des nageoires caudales.

Article 10.

Chacune des Hautes Parties contractantes se fera adresser par toutes les usines, flottantes ou établies sur la terre ferme, soumises à sa juridiction, des relevés indiquant le nombre des baleines de chaque espèce traitées dans chacune des usines et les quantités d'huile de chaque qualité, poudre, guano et autres sous-produits tirés de ces baleines.

Article 11.

Chacune des Hautes Parties contractantes communiquera les renseignements statistiques relatifs aux opérations, concernant les baleines, qui ont eut lieu dans le ressort de leur juridiction, à un organisme établi en vue de recueillir et de distribuer les statistiques de l'industrie baleinière. Les renseignements fournis devront comprendre au moins les détails mentionnés à l'article 9 et 1) le nom et le tonnage de chaque usine flottante; 2) le nombre et le tonnage global des navires baleiniers; 3) une liste des stations terrestres fonctionnant au cours de la période envisagée.

Ces renseignements seront fournis à des intervalles appropriés ne dépassant pas une année.

Article 12.

La présente Convention pourra être signée, jusqu'au ..... 19...., au nom de tout Membre de la Société des Nations ou de tout Etat non membre (invité à la Conférence ou)[1]) auquel le Conseil de la Société des Nations aura, à cet effet, communiqué un exemplaire de ladite Convention.

Article 13.

La présente Convention sera ratifiée et les ratifications seront déposées au Secrétariat de la Société des Nations.

Le Secrétaire général donnera connaissance du dépôt de chaque ratification aux Membres de la Société des Nations et aux Etats non membres, visés à l'article 12, en indiquant la date à laquelle ce dépôt a été effectué.

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[1]) Les mots entre parenthèses ne conviendront pas si la Convention est élaborée à l'Assemblée.

Article 14.

As from . . ., any Member of the League of Nations and any non-Member State mentioned in Article 12, on whose behalf the Convention has not been signed before that date, may accede thereto.

Accession shall be effected by an instrument deposited with the Secretariat of the League of Nations. The Secretary-General of the League of Nations shall give notice of each accession to the Members of the League of Nations and to the non-Member States mentioned in Article 12, indicating the date of the deposit of the instrument.

Article 15.

The present Convention shall enter into force on the ninetieth day following the receipt by the Secretary-General of the League of Nations of ratifications or accessions on behalf of not less than . . . Members of the League or non-Member States.

As regards any Member of the League or non-Member State on whose behalf a ratification or accession is subsequently deposited, the Convention shall enter into force on the ninetieth day after the date of the deposit of a ratification or accession on its behalf.

Article 16.

At any time after the coming into force of the present Convention any two Members of the League or non-Member States with regard to which the Convention is then in force may request the Council of the League of Nations to take measures with a view to the convening of a Conference for the revision of the Convention. Those Members of the League or non-Member States on whose behalf the Convention has been signed or accessions thereto deposited undertake to be represented at any Conference so convened.

Article 17.

1) The present Convention shall be concluded for a period of three years from the date of its entry into force (or, continuing until ..... 19....).
2) It shall continue in force for further successive periods of one year as between such Members of the League and non-Member States as do not denounce it at least six months before the expiration of the current period.
3) Denunciation shall be effected by a written notification addressed to the Secretary-General of the League of Nations, who shall inform all the Members of the League and the non-Member States mentioned in Article 12.

Article 18.

1) Any High Contracting Party may, at the time of signature, ratification or accession, declare that, in accepting the present Convention, he does not assume any obligations in respect of all or any of his colonies, protectorates, overseas territories or territories under suzerainty or mandate; and the present Convention shall not apply to any territories named in such declaration.

Article 14.

A partir du ....., tout Membre de la Société des Nations et tout Etat non membre, visé à l'article 12, au nom duquel la Convention n'a pas été signée à cette date, sera admis à y adhérer.

Son adhésion fera l'objet d'un acte déposé au Secrétariat de la Société des Nations. Le Secrétaire général notifiera chaque adhésion aux Membres de la Société des Nations et aux Etats non membres, visés à l'article 12, en indiquant la date à laquelle l'acte d'adhésion a été déposé.

Article 15.

La présente Convention entrera en vigueur quatre-vingt dix jours après que le Secrétaire général de la Société des Nations aura reçu des ratifications ou des adhésions au nom d'au moins ..... Membres de la Société des Nations ou Etats non membres.

A l'égard de chacun des Etats membres ou Etats non membres, au nom desquels une ratification ou une adhésion sera ultérieurement déposée, la Convention entrera en vigueur le quatre-vingt dixième jour après la date du dépôt de sa ratification ou de son adhésion.

Article 16.

A tout moment, après l'entrée en vigueur de la présente Convention, deux Membres de la Société, ou deux Etats non membres, à l'égard desquels la présente Convention sera à ce moment en vigueur, pourront demander au Conseil de la Société des Nations de prendre des mesures en vue de convoquer une conférence pour la revision de la Convention. Les gouvernements des Membres de la Société des Nations ou des Etats non membres, au nom desquels la Convention a été signée ou des adhésions à ladite Convention ont été déposées, s'engagent à se faire représenter à toutes les conférences qui seront ainsi convoquées.

Article 17.

1) La présente Convention sera conclue pour une période de trois années à partir de la date de son entrée en vigueur (ou s'étendant jusque ..... 19...).
2) Elle restera en vigueur pour de nouvelles périodes successives d'un an entre les Membres de la Société des Nations et les Etats non membres qui ne l'auront pas dénoncée au moins six mois avant l'expiration de la période en cours.
3) La dénonciation de la Convention s'effectuera par une notification écrite, adressée au Secrétaire général de la Société des Nations, qui en informera tous les Membres de la Société et les Etats non membres, visés à l'article 12.

Article 18.

1) Chacune des Hautes Parties contractantes peut déclarer, au moment de la signature, de la ratification ou de l'adhésion que, par son acceptation de la présente Convention, elle n'entend assumer aucune obligation en ce qui concerne l'ensemble ou toute partie de ses colonies, protectorats, territoires d'outre-mer ou territoires placés sous sa suzeraineté ou son mandat; dans ce cas, la présente Convention ne sera pas applicable aux territoires faisant l'objet d'une telle déclaration.

2) Any High Contracting Party may give notice to the Secretary-General of the League of Nations at any time subsequently that he desires that the Convention shall apply to all or any of his territories which have been made the subject of a declaration under the preceding paragraph, and the Convention shall apply to all the territories named in such notice . . . after its receipt by the Secretary-General of the League of Nations.

3) Any High Contracting Party may, at any time, declare that he desires that the present Convention shall cease to apply to all or any of his colonies, protectorates, overseas territories or territories under suzerainty or mandate; and the Convention shall cease to apply to the territories or to the parts of their population named in such declaration . . . after its receipt by the Secretary-General of the League of Nations.

4) The Secretary-General of the League of Nations shall communicate to all the Members of the League of Nations and the non-Member States mentioned in Article 12 all declarations and notices received in virtue of this article.

Article 19.

The obligation of a High Contracting Party to take measures to ensure the observance of the provisions of the present Convention in his own territories and territoral waters, and by his own vessels, shall not apply to those of his territories to which the Convention does not apply, and the territorial waters adjacent thereto, and to vessels registered in such territories.

Article 20.

The present Convention shall be registered by the Secretary-General of the League of Nations as soon as it has entered into force.

Article 21.

The French and English texts of the present Convention shall both be authoritative.
In faith whereof, etc.

Observations.

I.

The Economic Committee would like to point out that in elaborating the attached draft Convention, they had examined carefully the question of including a provision similar to that appearing in the Norwegian Law of June 21st, 1929, namely, that the prosecution of whaling in tropical and sub-tropical waters might be made unlawful within certain prescribed limits. They were, however, unable at present to recommend the inclusion of such a clause, but, in agreement with the views expressed by the experts consulted on this question, thought that it should be strongly recommended to the High

2) Chacune des Hautes Parties contractantes pourra ultérieurement notifier au Secrétaire général de la Société des Nations qu'elle entend rendre la présente Convention applicable à l'ensemble ou à toute partie de ses territoires ayant fait l'objet de la déclaration prévue au paragraphe précédent. Dans ce cas, la Convention s'appliquera à tous les territoires visés dans la notification ..... après la réception de cette notification par le Secrétaire général de la Société des Nations.
3) Chacune des Hautes Parties contractantes peut, à tout moment, déclarer qu'elle entend voir cesser l'application de la présente Convention à l'ensemble ou à toute partie de ses colonies, protectorats, territoires d'outre-mer ou territoires placés sous sa suzeraineté ou son mandat; dans ce cas, la Convention cessera d'être applicable aux territoires ou aux parties de leur population faisant l'objet d'une telle déclaration, ...après la réception de cette déclaration par le Secrétaire général de la Société des Nations.
4) Le Secrétaire général de la Société des Nations communiquera à tous les Membres de la Société des Nations et aux Etats non membres, visés à l'article 12, les déclarations et notifications reçues en vertu du présent article.

Article 19.

L'obligation pour l'une quelconque des Hautes Parties contractantes de prendre des mesures en vue d'assurer l'observation des dispositions de la présente Convention dans ses territoires et dans ses eaux territoriales et par ses navires, sera limitée à ceux de ses territoires auxquels s'applique la Convention et aux eaux territoriales contiguës ainsi qu'aux navires immatriculés dans ces territoires.

Article 20.

La présente Convention sera enregistrée par le Secrétaire général de la Société des Nations dès qu'elle sera entrée en vigueur.

Article 21

Les textes français et anglais de la présente Convention font également foi.
En foi de quoi, etc.

Observations.

I.

Le Comité économique tient à signaler qu'en élaborant le projet de convention ci-annexé, il a examiné attentivement la question de savoir s'il y avait lieu d'y introduire une disposition analogue à celle de la loi norvégienne du 21 juin 1929, à savoir que la chasse aux baleines dans les eaux tropicales et subtropicales pourrait être déclarée illicite dans certaines limites prescrites. Tout en n'étant pas actuellement en mesure de recommander l'insertion d'une telle clause, et d'accord avec l'opinion des experts consultés à cet égard, il a estimé qu'il convenait de recommander instamment aux parties

Contracting Parties to pursue such scientific investigations as might enable a conclusion to be reached as to whether the closure to whaling of any areas would be in the interest of the industry and, if so, what areas should be thus closed.

II.

While the Economic Committee recognised the lack of precision attaching to the word "immature" appearing in Article 4, they were of opinion that at present it was undesirable to attempt a closer definition.

They expressed the hope that the Governments of the High Contracting Parties might be in a position to arrive at a more precise definition when scientific researches have progressed sufficiently to enable conclusions to be reached.

III.

As regards sub-paragraph 2 of Article 5, the attention of Governments was drawn to the desirability of ensuring that floating factories should so conduct their operations that the remains of whales should not be allowed to drift ashore in localities where this would cause a nuisance.

IV.

It should be observed that in drafting Article 6 regard has been had to the terms of contracts generally used in some of the countries especially interested in whaling.

V.

It is understood that in supplying the body mentioned in Article 11 with the statistical data referred to in Article 9, the High Contracting Parties will indicate in their returns the units employed in the statistics so communicated.

VI.

It is understood that provision would have to be made to give the necessary exemptions for scientific investigations.

Appendix No. 3.

Amendment from the Canadian Government to replace paragraph 2 of Article 7.

Nothing in this Article shall prejudice the right of any High Contracting Party to require that, in addition, a licence shall be required from his own authorities by every vessel desirous of using his territory or territorial waters for the purposes of taking, *landing* or treating whales, and such licence *may be refused or* may be made subject to such conditions as may be deemed by such High Contracting Party to be necessary or desirable, independent of the nationality of the vessel.

contractantes de poursuivre les enquêtes scientifiques qui permettraient de s'assurer s'il est de l'intérêt de l'industrie baleinière de voir fermer certaines zones à la chasse, et, dans l'affirmative, de déterminer ces zones.

II.

Tout en reconnaissant le manque de précision des mots »non adultes« figurant à l'article 4, le Comité économique est d'avis qu'il n'y a pas actuellement lieu de chercher à donner une définition plus précise.

Il exprime l'espoir que les gouvernements des parties contractantes seront à même d'arriver à une définition plus précise, lorsque les recherches scientifiques auront suffisamment progressé pour permettre de formuler des conclusions.

III.

En ce qui concerne le 2° de l'article 5, l'attention des gouvernements est attirée sur l'opportunité de s'assurer que les usines flottantes opèrent de telle sorte que les résidus de baleines ne puissent venir s'échouer dans les localités où ils provoqueraient des inconvénients.

IV.

Il y a lieu de noter qu'en rédigeant l'article 6, on a tenu compte des termes des contrats généralement en usage dans certains pays particulièrement intéressés à la chasse à la baleine.

V.

Il est entendu qu'en fournissant à l'organisme mentionné à l'article 11 les données statistiques prévues à l'article 9, les Hautes Parties contractantes indiqueront, dans leurs relevés, les unités utilisées dans les statistiques ainsi communiquées.

VI.

Il est entendu qu'il y aurait lieu d'introduire une clause accordant les exemptions nécessaires dans le cas des recherches d'ordre scientifique.

Appendice No. 3.

Amendement du Gouvernement Canadien, à remplacer l'alinéa 2 de l'article 7.

Le présent article ne porte nullement atteinte au droit, pour l'une quelconque des Parties Contractantes, d'exiger, en outre, une licence émanant de ses propres autorités, pour tout navire désireux d'utiliser son territoire ou ses eaux territoriales en vue de capturer, de *débarquer* ou de traiter des baleines. La délivrance de cette licence pourra être *soit refusée*, *soit* subordonnée aux conditions que la Haute Partie Contractante intéressée estimera nécessaires ou opportunes, quelle que soit la nationalité du navire.

Editorial Committee.

Chairman: Professor O. Pettersson.

The Committee met on March 26th, 1931, at 2.30 p.m.

I. Proceedings.

1) The Chairman laid before the Committee the report regarding the publications issued and their approximate cost during the financial year 1930—31. With regard to the cost of the Journal Dr. Russell pointed out that the number of reviews had been very considerable, and that it was his intention in future to limit the length of reviews.

2) Dr. Russell reported on the position regarding the preparation of a pamphlet on fish marks. He distributed some draft sheets and explained how it was intended to arrange the subject matter. He suggested that the pamphlet should be printed in the format of the Journal, and that 250 copies should be made. He asked the Committee's opinion on the question of languages. It was agreed that it should be printed in English, as it seemed to be unnecessary to print in more than one language, the pamphlet being intended as a guide for members of the Council. Prof. Knudsen suggested that it should be printed in the first instance in the Journal and reprints taken for circulation. Dr. Fischer suggested that blank pages should be included for new marks. Dr. Russell further informed the Committee that information as to fish marks was still lacking from Denmark, Finland, Portugal and Sweden, but he hoped to have the pamphlet ready in about 2 months. As information had been received about fish marks in Canada, the United States and Russia it was the intention to publish these also. The marks would be reproduced in line drawings. The pamphlet would contain 25—30 pages.

3) Dr. Russell suggested that it might be worth while to permit advertisements to appear in the Journal. The Chairman said that he abhorred advertising, but had no objection, if it served practical purposes. Professor Knudsen did not think it worth while, if it only amounted to about 600 Kr. Dr. Russell and Dr. Fischer were in favour of advertising, and Prof. D'Arcy Thompson rather objected, but was willing to make a trial with 2 or 4 pages. The Chairman suggested that the question should be left to the Editor, with authority to accept up to 4 pages of advertisements.

4) Dr. Carruthers' suggestion as to labelling certain publications for library convenience had been distributed. Dr. Russell said that the President had suggested that the same purpose could be attained by using different colours for the covers. Prof. D'Arcy Thompson thought it too late to start such an arrangement in view of the fact that the Council had for thirty years past published reports with the same cover, but other members were in favour of the suggestion.

5) The only paper hitherto announced for publication was an Area report announced by the Baltic Committee. The report would be a summary of the various standpoints of Denmark, Germany, Poland and Sweden with regard to the flounder fisheries; no tables would be included and the report would not exceed 100 pages. The material would be handed in to the Office at the latest in the month of December.

Comité Editorial.

Président: Prof. O. Pettersson.
Le Comité se réunit le 26 Mars 1931 à 2h30 p.m.

I. Compte rendu.

1) Le Président soumet au Comité le Rapport concernant les publications sorties et leur prix approximatif pendant l'année financière 1930—31. Au sujet du coût du Journal, le Dr. Russell fait remarquer que le nombre des revues a été très considérable, et qu'il a l'intention à l'avenir de limiter leur longueur.
2) Le Dr. Russell rend compte de la situation au sujet de la préparation d'une brochure sur les marques à poissons. Il distribue quelques feuilles d'épreuves et explique comment il a l'intention d'arranger la matière. Il propose que la brochure soit imprimée dans le format du Journal et que 250 exemplaires soient tirés. Il demande l'avis du Comité sur la question des langues. On décide qu'il sera imprimé en Anglais parcequ'il semble inutile d'imprimer en plusieurs langues une brochure destinée à servir de guide à des membres du Conseil. Le Prof. Knudsen suggère qu'on l'imprime d'abord dans le Journal, puis qu'on en broche des tirés-à-part pour la distribution. Le Dr. Fischer suggère qu'on y insère des pages blanches pour les nouvelles marques. Le Dr. Russell communique au Comité que les informations manquent encore pour les marques à poissons de Danemark, de Finlande, de Portugal et de Suède, mais il espère que la brochure sera prête dans environ 2 mois. Comme il a reçu des informations au sujet des marques du Canada, des Etat-Unis et de Russie, il a l'intention de les publier aussi. Les marques seront reproduites en dessin linéaire. La brochure comprendra 25 à 30 pages.
3) Le Dr. Russell suggère qu'il serait peut être opportun d'admettre des réclames dans le Journal. Le Président déclare qu'il déteste la réclame, mais qu'il ne fera pas d'objection si la chose peut servir à des buts pratiques. Le Prof. Knudsen ne pense pas que la chose vale la peine s'il ne s'âgit que d'environ 600 Cr. — Le Dr. Russell et le Dr. Fischer sont en faveur de la réclame, et le Prof. D'Arcy Thompson est plutôt opposé, mais consentirait à faire un essai avec 2 ou 4 pages. Le Président propose que la question soit laissée à l'Editeur, avec autorisation d'accepter jusqu'à 4 pages de réclames.
4) La suggestion du Dr. Carruthers au sujet de l'étiquetage de certaines publications pour la facilité de la bibliothèque a été distribuée. Le Dr. Russell dit que le Président du Conseil a émis l'avis que le même but pourrait être atteint par l'emploi de différentes couleurs pour les couvertures. Le Prof. D'Arcy Thompson pense qu'il est trop tard pour adopter pareil arrangement, en présence du fait que le Conseil a, depuis trente ans, publié ses rapports sous la même couverture, mais d'autres membres sont favorables à la proposition.
5) Le seul travail annoncé jusqu'ici pour la publication est un rapport de secteur annoncé par le Comité Baltique. Ce rapport serait un sommaire de divers avis de l'Allemagne, du Danemark, de la Pologne et de la Suède, au sujet des pêcheries du flet, — il n'y aurait pas de tables et le rapport ne dépasserait pas 100 pages. Le matériel serait remis au Bureau au plus tard dans le mois de Décembre.

6) The desirability of scrutinising reports, not being Area reports, presented for printing was discussed. Prof. D'Arcy Thompson was of opinion that every paper should be reviewed either by the Chairman, the whole Editorial Committee or a referee chosen by them. The Chairman was in favour of electing a Committee for this purpose.

II. Recommendations.

1) It was recommended that the pamphlet entitled "A guide to fish marks" should be published first in the Journal and 250 reprints (with blank pages for the insertion of new marks) taken for circulation within the Council. The pamphlet should be printed in English and provided with line drawings of fish marks.

2) It is recommended that the question of advertisements in the Journal be left to the Editor who may at his discretion accept up to 4 pages of advertisements.

3) It was recommended that differents colours be used for the covers of Rapports & Procès-Verbaux:— the Procès-Verbaux unchanged, one colour for Area Reports, one for special Reports, as for instance, Prof. Henking's Salmon Report, one for Reports of Biological and one for reports of Hydrographical Meetings.

4) It was recommended that an Area Report for the Baltic Committee be printed concerning the flounder in the Baltic.

6) On discute pour décider s'il est désirable que les rapports présentés pour l'impression, qui ne sont pas des rapports de Secteurs, soient scrutés préalablement. Le Prof. D'Arcy Thompson est d'avis que tout travail devrait être examiné soit par le Président, soit par le Comité tout entier, soit par un référendaire choisi par lui. Le Président est en faveur de l'élection d'un Comité à cet effet.

II. Recommandations.

1) Il est recommandé que la brochure intitulée »A guide to fish marks« soit publiée d'abord dans le Journal, et que 250 tirés-à-part soient exécutés pour la distribution dans le Conseil. La brochure doit être imprimée en Anglais et contenir des reproductions des marques à poissons en dessin linéaire. On réservera des pages blanches pour les marques nouvelles.
2) Il est recommandé de laisser la question des réclames dans le Journal à l'Editeur et à sa discrétion, dans les limites de 4 pages de réclames.
3) Il est recommandé d'employer des couleurs différentes pour les couvertures des Rapports et Procès-Verbaux: les Procès-Verbaux sans changement, une couleur pour les Rapports des Secteurs, une pour les Rapports spéciaux, comme, par exemple, le Rapport du Prof. Henking sur le Saumon, une pour les Rapports des Réunions Biologiques et une pour les Rapports des Réunions Hydrographiques.
4) Il est recommandé d'imprimer un Rapport de Secteur pour le Comité Baltique concernant la limande dans la Baltique.

Reports of Special Scientific Meetings.

Biological Scientific Meeting.

Chairman: Professor JOHAN HJORT.
The Meeting was held on March 27th, 1931, at 10.00 a.m.

I. Proceedings.

Professor JOHAN HJORT in his introductory remarks suggested that at a future biological meeting the question of the influence of light might be treated.

The following lectures were given:—

Professor AUGUST KROGH: Dissolved Substances as Food of aquatic Organisms.
Professor H. H. GRAN: On the Conditions for the Production of Plankton in the Sea.
Dr. R. SPÄRCK: Biochemical and biological Investigations of the Variations in the Productivity of the west Norwegian Oyster Pools.
Dr. KURT BUCH: On the work of the conference in Helsingfors on the carbonic acid in sea water.
Dr. H. WATTENBERG: Beziehungen zwischen Kalkgehalt des Meerwassers und Plankton.
Dr. H. W. HARVEY: On the Rate of Photosynthesis by Diatoms.
Dr. KURT BUCH: Eine biologisch-chemische Studie im Hafenwasser von Helsingfors.

Professor GRAN supported Professor HJORT's proposal for a meeting to discuss the influence of light, including 1) the light as a limiting factor in the photosynthesis of the phytoplankton, 2) the methods of measurement of the light intensity at different depths and 3) the influence of light on the vertical migrations of the pelagic animals, as suggested in the Plankton Committee by Mr. FARRAN.

Professor HANS PETTERSSON spoke on his experiments with ultraviolet rays.

The Chairman's proposal was adopted and the matter will be further discussed at a later date.

Professor D'ARCY THOMPSON spoke in appreciation of the meeting, which was then closed.

II. Recommendation.

It was recommended that the papers read at the meeting should be published.

Rapports des Réunions Spéciales Scientifiques.

Réunion Scientifique Biologique.

Président: Prof. Johan Hjort.
La réunion se tient le 27 Mars 1931 à 10h a.m.

I. Compte rendu.

Le Prof. Johan Hjort présente quelques remarques introductives et suggère que l'on puisse traiter, à une réunion biologique prochaine la question de l'influence de la lumière.

Les communications suivantes sont présentées:

Le Prof. August Krogh: Les substances dissoutes comme aliment des organismes aquatiques.

Le Prof. H. H. Gran: Sur les conditions de la production du plancton dans la mer.

Le Dr. Spärck: Recherches biochimiques et biologiques sur les variations de la productivité des bassins huitriers de la Norvège occidentale.

Le Dr. Kurt Buch: Sur le travail à la Conférence de Helsingfors sur l'acide carbonique dans l'eau de mer.

Le Dr. H. Wattenberg: Relations entre la contenance en chaux de l'eau de mer et le plancton.

Le Dr. H. W. Harvey: Sur la rapidité de la photosynthèse par les diatomées.

Le Dr. Kurt Buch: Une étude bio-chimique dans l'eau du port de Helsingfors.

Le Prof. Gran appuie la proposition faite par le Prof. Hjort, d'une réunion au sujet de l'influence de la lumière comprenant 1) la lumière comme facteur limitant de la photosynthèse du phytoplancton; 2) les méthodes de mesure de l'intensité de la lumière à diverses profondeurs; 3) l'influence de la lumière sur les migrations verticales des animaux pélagiques ainsi que M. Farran l'a suggéré au Comité du Plancton.

Le Prof. Hans Pettersson fait quelques remarques sur ses recherches avec les rayons ultraviolets.

La proposition du Président est adoptée et une discussion ultérieure de cette question aura lieu plus tard.

Le Prof. D'Arcy Thompson clôture la réunion par quelques mots d'appréciation.

II. Recommandation.

Il est recommandé que les travaux présentés dans la réunion soient publiés.

Hydrographic Scientific Meeting.

Chairman: Prof. M. KNUDSEN.
The Committee met on March 27th at 10 a.m.

I. Proceedings.

1) Professor V. W. EKMAN gave a lecture on Internal Waves. In the discussion took part: Director VAN RIEL, — who gave a communication about internal waves observed in the Dutch East Indies during the "Snellius" Expedition, — Professor N. ZEILON, Professor DEFANT, Professor EKMAN and Dr. JACOBSEN.
2) Professor G. I. TAYLOR gave a lecture on Internal Waves and Turbulence in a Fluid of variable Density.

   In the discussion took part: Dr. THORADE, Dr. JACOBSEN, Prof. V. W. EKMAN and Professor WITTING.
3) Dr. H. THORADE gave a lecture on Mixing, Turbulence and Boundaries.
4) Professor OTTO PETTERSSON gave a lecture on the Oceanic Circulation and its Variations.

II. Recommendations.

1) That the papers read and the discussions should be printed.
2) That the subjects to be discussed at next year's scientific meeting should be the same as have been treated this year.
3) That it would be very valuable to have the help next year also of Profs. EKMAN, TAYLOR and Dr. THORADE.

Réunion Scientifique Hydrographique.

Président: Prof. M. KNUDSEN.
Le Comité se réunit le 27 Mars 1931 à 10h a.m.

I. Compte rendu.

1) Le Prof. V. W. EKMAN lit un travail sur les vagues internes. Prennent part à la discussion: le Directeur VAN RIEL (qui donne une communication sur les vagues internes observées aux Indes Orientales Néerlandaises pendant l'expédition du "Snellius"), — le Prof. ZEILON, le Prof. DEFANT, le Prof. EKMAN et le Dr. JACOBSEN.
2) Le Prof. G. I. TAYLOR lit un travail sur les vagues internes et la turbulence dans un fluide de densité variable.

   Prennent part à la discussion: le Dr. THORADE, le Dr. JACOBSEN, le Prof. EKMAN et le Prof. WITTING.
3) Le Dr. H. THORADE lit un travail sur le mélange, la turbulence et les limites.
4) Le Prof. OTTO PETTERSSON lit un travail sur la circulation océanique et ses variations.

II. Recommandations.

1) Que les rapports lus et leurs discussions soient imprimés.
2) Que les sujets à traiter et à discuter aux réunions scientifiques de l'année prochaine soient les mêmes que ceux de cette année.
3) Qu'il serait très utile d'avoir l'année prochaine l'assistance des Prof. EKMAN et TAYLOR et du Dr. THORADE.

REPORT

of

ADMINISTRATION 1930—1931.

I. General.

Composition of the International Council for the Exploration of the Sea.

During the year 1930—31 no changes have occurred in the composition of the International Council.

Composition of the Bureau.

The members of the Bureau were the same as in the preceding year:— Mr. H. G. Maurice, President, Professor Johan Hjort, Professor Otto Pettersson, M. Théodore Tissier and Dr. C. Heinrici, Vice-Presidents.

Committees.

A list of the Committees will be found in the Procès-Verbaux of the last Council Meeting. All these Committees remain in being and continue their activities.

Audit of Accounts.

The Accounts of the Council for 1929—30, audited by a qualified accountant and examined and found correct by the Finance Committee, will be submitted to the Council for final approval.

A provisional statement is given below of the Accounts for 1930—31 which have to be examined by the Finance Committee.

Statement of Accounts for the financial year 1930—1931.

Receipts:

			Estimates	Real Receipts
I.	1.	Balance brought forward from 1929—30	191 046.36	191 046.36[1])
II.	2.	Annual contributions of the Governments:		
		for 1929—30	172 000.00	57 000.00
		- 1930—31		90 000.00
III.	3.	Interests on Bank deposit	4 000.00	2 565.18
IV.	4.	— - Treasury bonds	3 500.00	4 750.00
V.	5.	Sale of publications	2 500.00	2 478.56
		Total Kr.	373 046.36	347 840.10

Expenditure:

		Ordinary Expenditure:—	Estimates	Real Expenditure
I.	1—6.	Incidental expenses	17 000.00	17 000.00
II.	7—11.	Administrative Staff	40 700.00	40 700.00
III.	12.	Expenses of the office in Copenhagen	15 000.00	14 615.36
IV.	13.	Travelling expenses	14 500.00	18 181.77
V.	14.	Chairmen of Committees	30 000.00	29 750.00
VI.	15.	Printing and distribution	53 000.00	48 277.74
VII.	16.	Transferred to Pension Fund	3 500.00	3 500.00
		Extraordinary Expenditure:—		
VIII.	17.	Special Resolutions of the Council:		
		(a) Chargeable to revenue.		
		Carbonic Acid researches in Helsingfors	6 500.00	6 500.00
		Experiments with Plankton nets	800.00	400.00
		Ostenfeld's Plankton Résumé	1 000.00	1 000.00
		Supplementary expenditure for Binding of books	800.00	800.00
		(b) Chargeable to reserve.		
		Mrs. Drechsel's pension	6 500.00	6 500.00
		Cost of production of Prof. Joubin's Fiches Faunistiques	9 000.00	8 999.73
		Honorarium to Prof. Joubin for the first four sets of Fiches Faunistiques	1 000.00	1 000.00
		Liverpool Tidal Institute	2 730.00	0.00
		Mr. Matthew's Salinity Tables	1 500.00	0.00
		Subvention to Prof. Gilson's work	0.00	2 500.00
		Total Kr.	203 530.00	199 724.60

[1]) + Russia's contribution for 1914/15, **Rbl. 14 430.54,** deposited in a Leningrad bank and not yet recovered.

Receipts	per 31/3 1931	Kr. 347 840.10
Expenditure	per 31/3 1931	- 199 724.60
Cash balance	per 31/3 1931	**Kr. 148 115.50**

Of this Balance there were deposited in Kjøbenhavns Handelsbank and cash	Kr. 29 572.07
Danish Treasury Bonds, nominal Kr. 120 000.00 (Market value on March 31st, Kr. 122 400.00) Purchase value	- 118 543.43
	Kr. 148 115.50

All Contributions for 1929—30 have been received. The following countries have not yet paid their Contributions for 1930—31: Great Britain, Finland, France, Italy, the Netherlands, Portugal and Latvia.

Special reserve for pensions:

Danish Treasury Bonds, nominal Kr. 19 000.00, deposited in a box in the bank (Market value on March 31st 1931, Kr. 19 340.00). Purchase value	Kr. 18 803.39
Deposited in Kjøbenhavns Handelsbank	- 504.90
	Kr. 19 308.29

Meetings.

Meetings of the Bureau attended by all members were held in Copenhagen in May-June and in Lowestoft in November 1930.

A meeting of experts was held in Lisbon in October for the purpose of deciding upon uniform methods for the ichtyometrical study of the races of pilchards. The meeting was attended by Messrs. G. Belloc, F. de Buen, J. le Gall (in the chair), A. Ramalho and G. Steven; Dr. Alaejos was not able to be present. The Committee passed the following Resolutions:—

Résolutions des Experts à Lisbonne.

"Les experts décident d'entreprendre aussitôt que possible dans leurs secteurs respectifs les travaux recommandés aux §§ 1 et 2 (Cartes de pêche, Engins de pêche, Rôle sélectif de ces engins) de façon à ce que puisse être présenté à une prochaine session du Conseil International un premier travail d'ensemble sur ces principaux points.

§ 1. Régions de pêche de la Sardine.

Après un échange de vue entre les experts sur les différentes régions de pêche de la sardine, les époques de ponte, les engins employés, ceux-ci décident de recommander: que dans chaque pays, une première étude soit faite: établissant d'une façon précise: les régions et époques de pêche, les bateaux et engins employés, les principaux ports de débarquement du poisson, les laboratoires maritimes étudiant la biologie de la sardine, et conviennent d'établir les secteurs suivant pour cette étude.

Régions de pêche	Convention Internationale	Pays intéressés et Laboratoires
I. Manche.	Secteurs VII e et VII d.	France (Boulogne), Angleterre (Plymouth).
II. Côtes de Bretagne, Entrée Occidentale de la Manche	Secteurs VII h et VIII a	France (Boulogne-Lorient), Angleterre (Plymouth).
III. Golfe et Cantabrique.	Secteurs VIII b, VIII c?	France (La Rochelle et St. Jean de Luz), Espagne (Santander).
IV. Côte Ouest Ibérique, Madère et Açores.	Secteurs IX a, X b	Espagne (Madrid), Portugal (Lisbonne).
V. Côte Sud Ouest Espagne, Canaries, Maroc, Mauritanie.	Secteurs IX a, X a, XI a et b.	Espagne (Madrid et las Palmas), France (Boulogne).

Les experts recommandent également que dans chacun des secteurs établies, des observations hydrologiques: températures, salinités, soient faites dans les régions de pêche.

§ 2. Les Engins de pêche.

Après un échange de vues et discussion, les experts ramenant les engins de pêche actuellement employés pour la pêche de la sardine à deux types: Les filets fixes ou dérivants et les sennes,

admettent la sélection faite par les filets dérivants ou fixes,

reconnaissent que cette sélection faite par un ensemble de filets du même "moule" sur une même pêcherie peut néanmoins donner une idée suffisamment exacte de la constitution de la population sardinière concentrée sur cette pêcherie,

recommandent que les recherches soient continuées dans chaque région sur le rôle sélectif des filets dérivants ou fixes de différents modèles (mailles variables) au point de vue taille et âge de la population sardinière, et que, de façon à préciser ce rôle sélectif des filets, l'analyse de captures faites dans des mêmes régions ou dans des régions très voisines, aux filets dérivant et à la senne tournante, soit poursuivie chaque fois qu'il le sera possible."

A full report of the meeting appears in the Rapport Atlantique for 1930.

At Lowestoft, on November 3rd, a meeting was held to consider the commercial prospects of the transplantation of plaice. The report of this meeting which is appended has been circulated to all Delegates with a request to the Delegates of those countries interested in the North Sea Fisheries that they would consider the question of a contribution towards the cost of an experiment in Plaice Transplantation on the scale suggested in the Report, and inform the Bureau whether their Governments would be disposed to contribute to the cost of the experiment, and, if so, to what extent. In reply to this inquiry the Government of the Netherlands asked what proportion of the general expenses would be contributed by other nations interested in Doggerbank trawl fishery.

The Belgian Government replied that they did not find it opportune to contribute to this very expensive experiment and the French Government also regretted being unable to participate in the experiment.

The following is the report of the Committee:—

Sub-Committee on Plaice Transplantation

held at the Fisheries Laboratory, Lowestoft, November, 3rd, 1930.

Committee: Dr. E. S. Russell, in the Chair.
Prof. W. Mielck. Dr. E. M. Poulsen.
Dr. J. J. Tesch. Prof. W. Garstang.
Mr. R. Jackson (representing the British Trawlers' Federation).

In addition to the members of the Sub-Committee there were present also Mr. H. G. Maurice, Dr. J. Hjort, Mr. David T. Jones, Prof. E. Ehrenbaum, Dr. A. Bowman, Prof. O. Pettersson, Sheriff Lyon Mackenzie, Mr. Moss-Blundell, Mr. Davis, Mr. Wollaston, Mr. Edser, Mr. Atkinson and Miss D. E. Thursby-Pelham.

The Chairman expressed his regrets that Dr. Johansen was unable to be present owing to ill-health and that Sir John Marsden had been prevented from attending, and welcomed their representatives Dr. Poulsen and Mr. Jackson.

The Chairman pointed out that the main business of the meeting was to consider whether it would be commercially profitable to transplant one million plaice from the Horns Reef grounds to the Dogger Bank and suggested that the notes attached (Annexe 1) should be taken as the basis for discussion. This was agreed.

The Committee then discussed Estimate A (Annexe 2).

Dr. Poulsen described the method whereby the transplantation would be carried out. He said it would be advisable to do it in April. The fish would be caught by the Danish seine and transferred to well-boxes at Esbjerg, where they should remain for a few days till they had evacuated their stomach contents. They should then be taken in well-smacks to the Dogger Bank. Payment would be made only for fish delivered on the Bank in good condition. Each smack would take about 2500 kilos of plaice per trip, or approximately 25,000 plaice. It would be possible to engage ten well-smacks for the purpose. The transplantation could therefore be done in four trips for each smack. There would be no difficulty in procuring a sufficient number of well-boxes in Esbjerg for storing the fish.

The length of time that would be taken for carrying out the whole transplantation would depend greatly upon weather conditions, since it would not be advisable to transplant the plaice in rough weather. The smacks travel about six knots and would take about 2 days out to the Dogger and 2 days to return. The actual operation of putting the fish overboard would only take about 2 hours.

Professor Garstang suggested that April was too early in the year to transplant, since the fish would be liable to be caught very soon after transplantation, as the Dogger is heavily fished in April and May. The Committee considered that a month would have to be allowed for the operation.

The question as to how the experiment might best be controlled was then discussed. Dr. Poulsen said that the Danes could undertake to supervise the work on the Danish side but that the actual liberation and examination of the plaice on the Dogger should be carried out by the English; it would be best for the "George Bligh" to convoy the vessels and keep in touch with them.

Dr. Tesch thought that Holland might be able to take part in some of the convoy duties.

Dr. Russell asked the Committee whether they considered it would be desirable to send someone on board the smacks and it was agreed that this would be of value.

Mr. Moss-Blundell suggested that the Naval Patrol vessels might also help in the convoying of the smacks.

Dr. Russell said that the approximate cost of the "George Bligh" for a fortnight would be £250.

Professor Garstang thought that the cost of the "George Bligh" should not be taken into account since this first transplantation on a large scale would be of the nature of a scientific experiment, but Dr. Russell was of contrary opinion.

Professor Garstang said that he thought the Committee should not consider this as an isolated experiment but should look forward to the time when one or two or more millions of plaice were transplanted each year to the Dogger Bank, and the time might come when the Industry would think it desirable to construct special well-boats for the purpose, which would be capable of transplanting a million plaice in one or two trips.

Dr. Hjort thought it would be desirable that a reliable Danish fisherman, used to the transplanting of plaice, should be taken on board each smack.

Dr. Poulsen thought this would be possible and that the pay of such a man would amount to £4.10.0 to £5 per week. It was agreed therefore that the actual cost of carrying out the transplantation of a million plaice would be as follows:—

Cost of Transplantation ..... £2,750 (as in Estimate A)
Cost of Control ("George Bligh") 14 days £250, and more in proportion

or A man sent on board each smack at £4.10.0 a week.... £180.

The Committee agreed that £3,000 could be taken as the total cost, including cost of control and the marking of a certain proportion of the transplanted fish.

Estimate B 1 (Annexe 3).

Dr. Russell explained that arbitrary figures for the percentage of plaice recaptured had been taken, since the proportion returned in the second year in the previous plaice transplantation experiments had been very low. This was possibly due to the marks working out, so that transplanted fish were not recognised. In the experiments that were carried out up to 1921 only 18 per cent were returned in the first year. In the 1924 experiments 27 per cent. were returned in the same period.

Mr. Atkinson then gave an account of the method employed for the experiment carried out in 1924. It was rendered possible by the courtesy of the Naval authorities in allowing H. M. S. "Dee" to do the work. In April of that year, H. M. S. "Dee" went to Esbjerg taking Mr. Atkinson on board. Approximately 2000 plaice were bought from boxes and transferred to tanks in the "Dee". The average size of the fish was about 25 cms. The plaice were examined and marked on the voyage to the Dogger and proved to be in very sound condition. Only one to two per cent. had to be discarded. The experiment was very successful as may be seen by the high percentage returned; this may have been due to the plaice being larger than those used in previous experiments. (See Estimate B, No. 2).

Dr. Russell suggested that a twenty per cent recapture rate could be taken as a minimum estimate; this would yield £7,400 in two years.

The Committee discussed the danger of the fish being recaptured very shortly after liberation but considered that this could be prevented by liberating them over a wide area. Mr. Atkinson and Dr. Bowman said that they had found it very difficult to recapture marked fish immediately after liberation.

Dr. Hjort suggested that a large number might be marked by punching a round hole in the fin in order to attract the attention and enlist the interest of the fishermen. Dr. C. G. J. Petersen had done this and had found that it answered the purpose very satisfactorily. The Committee agreed to this suggestion.

Mr. Jackson thought that all the information available should be put before the industry; it seemed to him that it was a very reasonable proposition and that it should be done not in one year only but continuously. He was of the opinion that it would be favourably received by the industry. The difficulties lay in what proportion of the cost should be borne by the fishing industry of the countries concerned.

Professor Garstang suggested that forty per cent be taken as the maximum yield; it was agreed after discussion to accept thirty per cent as a conservative estimate.

The Committee came to the conclusion that the estimate of the total yield from transplanting a million plaice should be regarded as lying between £7,400 and £10,000.

Estimates C 1 and C 2 (Annexe 4).

Dr. Russell explained the basis on which he had calculated estimate C 2 for the value of the million plaice if they were not transplanted, and suggested that the estimate of £2,000 should be taken as a basis for discussion.

Professor Garstang and Professor Mielck thought that the value of the plaice if left on the Horns Reef ground would be negligible. Professor Garstang said that the removal of a million plaice would improve the growth-rate of the remainder, and Professor Mielck thought that a few trawlers fishing would probably take at least a million plaice that would be destroyed uselessly, since they would be of unmarketable size, in a very few days.

Dr. Poulsen thought that £2,000 was too high an estimate, and it was agreed after discussion that £1,000 should be taken as the value of the plaice if left on the Danish grounds.

Estimate D.

After considerable discussion it was agreed that it was uncertain whether the removal of the million plaice represented an increase in the normal intensity of fishing. It was impossible to estimate the effect on the growth-rate of the remaining fish.

The Committee concluded, therefore, that the profit of the operation could be estimated as follows:—

Cost of Transplantation of 1,000,000 Plaice, including control and marking	£3,000	Minimum yield from transplantation.	£7,400
Value of 1,000,000 Plaice if left on the Horns Reef grounds	£1,000	Maximum ditto	£10,000
		Minimum profit	£3,400
		Maximum profit.....	£6,000

The Committee then agreed on the following report..

"The Committee having considered the estimates contained in the appendices annexed hereto, is of opinion (A) that the probable cost of transplanting one million plaice from the Horns Reef area to the Dogger Bank would be £3,000, including the cost of control, (B) that the probable yield from these plaice in two years would be from £7,400 to £10,000, (C) that the yield from the plaice if left on the Danish grounds may be estimated at £1,000, (D) that the favourable effect on growth rate on the Danish grounds cannot be estimated.

It draws the conclusion that the probable profit of the operation would be from £3,400 to £6,000, after allowance has been made for all contingencies. It accordingly recommends that this large scale transplantation experiment should be undertaken as soon as possible."

Various members urged the desirability of having the transplantation carried out next April. It was recognised that it would be a matter for international consideration and the Chairman was requested to lay the report of the Committee before the Bureau of the International Council for the Exploration of the Sea when they met on the following day. The Chairman agreed to do all that was possible to expedite the matter.

(Signed) E. S. Russell,
Chairman.

D. Thursby-Pelham,
Secretary.

Annexe 1.

Transplantation of Plaice to Dogger Bank.

Notes for the Discussion on Nov. 3rd, 1930.

1. There will be general agreement that transplantation is desirable from the scientific point of view, for it would remove a considerable number of young plaice from an area where food is relatively scarce and growth-rate comparatively slow to an area where, normally, food is plentiful and growth-rate is at a maximum. Although it

is known that the amount certainly of one kind of fish food on the Dogger varies enormously, all transplantation experiments to the Dogger have shown a high growth-rate of the transplanted fish. No transplantation experiments have, however, been carried out since 1924. There is also a certain risk that if the transplantation of a very large number coincided with a minus fluctuation of food on the Dogger, or a plus fluctuation in the numbers of competitors for the food, growth-rate might be depressed below that shown in the earlier experiments. This is a matter which can only be settled by further experiment.

2. A large-scale experiment can, however, only be justified if there is a reasonable probability that the costs will not only be recouped but a profit shown. In other words, the proposal must be regarded from a commercial point of view. Transplantation must pay — otherwise it will never be taken up by the fishing industries of the various countries concerned.
3. It is therefore all-important to establish, on the basis of detailed and reasoned estimates, the probable costs and probable profits of the transplantation of, say, one million plaice from the Horns Reef grounds to the Dogger Bank.
4. Obviously the first thing is to estimate the costs of catching and transporting the fish. In this connection the cost of administrative control and supervision must be considered in addition to the payments to fishermen for collection and transport. Let us call this estimate ..... A
5. We must then estimate the probable yield over a period of at least two years of the transplanted fish ..... B
6. We must then consider what would have been the yield from the million fish in two years had they been left on the Horns Reef grounds C
7. We must also take into account the probable beneficial effect upon the growth-rate of the Horns Reef plaice of the removal of one million fish ..... D
8. Only if $B + D$ exceeds by an adequate margin $A + C$ will transplantation pay.
9. The justification for this method of estimation is as follows. Transplantation represents an increased cost of production — something added on to the normal costs of catching fish. If this extra cost is not incurred, there will be a yield (C) from one million plaice on and near the Horns Reef grounds. If transplantation is carried out, the yield from these plaice will be (B), and (B) will normally be greater than (C), owing to the increased growth-rate. Against the cost of transplantation (A) we have to set, not the total yield of the transplanted fish (B) but the difference between (B) and (C). In either case, i. e. with transplantation or without, a certain proportion of the one million plaice will be caught; all that is gained by transplantation is the difference between the yield of a fast-growing stock and the yield of a slow-growing stock, plus a probable increase of yield from the stock left on the inshore grounds (D).

Note. Dr. Johansen and myself hope to circulate before the meeting detailed estimates as to A, B, and C.

29. 9. 30.

E. S. Russell.

Annexe 2.

Estimate A.

Confidential.
(Translated).

July 16, 1930.

Hr. Fiskeeksportør .....[1])

The English fisheries authorities are considering the possibility of making an experiment with transplantation of 100,000 kilogrammes undersized plaice of 18—25 cm's total length from the Horns Reef Grounds to the south western part of Dogger Bank in April or May 1931. Would you eventually be willing to undertake this transplantation and how much will the cost be for 100,000 kilogrammes fresh living fish delivered at the named place during a period of 10—14 days?

Please regard this matter as confidential.

A. C. Johansen.

Confidential.
(Translated).

July 20, 1930.

Hr. Dr. A. C. Johansen, Biologisk Station.

I beg to acknowledge, with thanks, your letter of July 16th which I have received.

Concerning the transplantation of the said amount of small plaice, I am willing to do the work, and I am thankful that an offer like this is given to me, no matter if it turns out a business or not. Many things have to be taken into consideration if a transplantation like this really shall turn out a success. I mean the fish must be liberated in a good (lively) condition: firstly the fishing part of it, secondly the transport to the place of liberation, which certainly must be undertaken in good weather. That is why it is difficult to decide the time for the amount of the transplantation and the time to do it, as the plaice in the Horns Reef area do not arrive at the same time every year. Last year for instance the plaice were late in coming. All these possibilities have to be taken into consideration. It is a rather long distance to take living fish. The weather can be rough and rather spoil it.

As said before, I am willing to do the work and shall do everything as carefully as possible. I understand a guidance concerning the price is wanted and I will estimate this to be about 50 Øre pr. kg. I want to say I have sufficient tonnage of welled smacks to carry out the transplantation.

Hoping this will make a satisfying basis at present, I expect to hear from you later.

.....[1])

Note. This estimate amounts to 50,000 Danish Kroner (i. e. £2,777) for transplanting 1;000,000 fish.

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[1]) The name is confidential.

Annexe 3.

Estimate B (No. 1).

The following Table is based upon the weights of recaptured fish given in Table 14 of BORLEY's "Report on the Experimental Transplantation of Plaice to the Dogger Bank" (Fourth Report, Southern Area, on Fishery and Hydrographical Investigations,

Months after Liberation	Average weight (grams)	Numbers out of 10,000 recaptured, calculated on			Weight of recaptures		
		(1) 20 per cent. each year basis	(2) 30 per cent. each year basis	(3) 40 per cent. each year basis	(1) Kgs.	(2) Kgs.	(3) Kgs.
1 (May)	100	184	293	417	18.4	29.3	41.7
2	100	181	284	400	18.1	28.4	40.0
3	122	177	276	383	21.6	33.7	46.7
4	172	174	268	367	29.9	46.1	63.1
5	201	171	260	351	34.4	52.3	70.6
6	342	168	253	337	57.5	86.5	115.3
7	352	165	245	323	58.1	86.2	113.7
8	367	162	238	309	59.5	87.3	113.4
9	362	159	231	296	57.6	83.6	107.2
10	363	156	224	284	56.6	81.3	103.1
11	382	153	217	272	58.4	82.9	103.9
12	440	150	211	261	66.0	92.8	114.8
13 (May)	478	147	205	250	70.3	98.0	119.5
14	544	145	199	240	78.9	108.3	130.6
15	616	142	193	230	87.5	118.9	141.7
16	638	139	188	220	88.7	119.9	140.4
17	557	137	182	211	76.3	101.4	117.5
18	779	134	177	202	104.4	137.9	157.4
19	973	131	171	194	127.5	166.4	188.8
20	945	129	166	186	121.9	156.9	175.8
21	846	127	162	178	107.4	137.1	150.6
22	961	125	157	170	120.1	150.9	163.4
23	864	123	152	163	106.3	131.3	140.8
24	793	121	148	156	96.0	117.4	123.7

1912), omitting Experiment 14. The average length on liberation is 21.5 cm. and the average weight is taken as 100 grams (the mean in BORLEY's experiments was 96.87). Month of liberation is taken as April. A length of 25 cm. mean weight, 172 grams, is reached during August.

The Table shows the estimated yield from 10,000 plaice transplanted to the Dogger, on the assumption of uniform recapture rate of 20 per cent., 30 per cent. and 40 per cent. per annum.

The average value of plaice, based on the total landings at Lowestoft and Grimsby from the North Sea is £0.043 per kilogram. The Table may be summarised as follows:—

1. After one year.

	Recapture Rate		
	20 per cent.	30 per cent.	40 per cent.
Number caught	2000	3000	4000
Weight caught (Kgs.)	536	790	1034
Value (£)	22	34	44

2. After two years.

	Recapture Rate		
	20 per cent.	30 per cent.	40 per cent.
Number caught	3600	5100	6400
Weight caught (Kgs.)	1721	2335	2784
Value (£)	74	100	120

The estimated values of the yields from 1,000,000 transplanted plaice are accordingly as follows:—

(a) in one year on a 20 per cent. recapture basis..... £2,200
- — — - - 30 - — — — £3,400
- — — - - 40 - — — — £4,400

(b) in two years on a 20 per cent. recapture basis..... £7,400
- — — - - 30 - — — — £10,000
- — — - - 40 - — — — £12,000

E. S. Russell.

Estimate B (No. 2).

Marked Plaice released on the Dogger Bank, April 26th—27th, 1924, and recaptured during the succeeding 24 months.

(1873 fish released. Figures for recaptured fish raised to relate to 10,000 released.)

Months after Liberation	Average Weight (grams)	No. Recaptures	Weight of Recaptures (kilos)
1 (May)	163	326	53.2
2	162	219	35.4
3	191	214	40.9
4	285	427	121.7
5	323	464	150.1
6	407	310	126.1
7	465	117	54.4
8	440	85	37.4
9	439	75	32.9
10	452	64	28.9
11	470	128	60.1
12	537	256	137.5
13	499	128	63.9
14	523	64	33.5
15	569	64	36.4
16	640	48	30.7
17	594	32	19.0
18	700	21	14.7
19	480	5	2.4
20	380	5	1.9
21	675	16	10.8
22	631	16	10.1
23	940	5	4.7
24	750	32	24.0
Total...	..	3,121	1,130.7

Value of Recaptured Fish at £0.043 per kilo

In 1 year £38

In 2 years..... £49

Recaptures

1st year..... 27 per cent.

2nd year ..... 6 per cent. of remainder

E. S. Russell.

Annexe 4.

Estimate C (No. 1).

Marked Plaice released off the Danish Coast, May, 1929, and recaptured during the succeeding 16 months.

(1544 fish released. Figures for recaptured fish raised to relate to 10,000 released.)

Months after Liberation	Average Weight (Grams)	No. Recaptured	Weight of Recaptures (kilos)
1 (May)	221	1,075	237.2
2	218	829	180.5
3	221	551	121.9
4	268	823	220.7
5	237	214	50.7
6	258	91	23.5
7	249	97	24.2
8	241	32	7.7
9	220	91	20.0
10	201	130	26.1
11	226	175	39.5
12	231	259	59.7
13	244	181	44.2
14	265	117	31.0
15	340	97	33.0
16	235	26	6.1
Total...	..	4,788	1,126.0

Value of Recaptured Fish at £0.043 per kilo

In one year £43

In 16 months..... £48

Recaptures during 1st 12 months ..... 44 per cent.

E. S. Russell.

Estimate C (No. 2).

Yield from one million plaice of average length 21 cm. left on Horns Reef Grounds.

First Year. Say one third are captured at an average weight of 160 grams, and that the value is 0.15 kroner per kilogram. The yield will be 8,000 kroner (ca. £440).

Second year. Two thirds of a million are left at the beginning of this year, at an average length of 26 cm. Applying to these the calculations contained in Estimate C (No. 1), we get a catch of 67,446 kilograms in 12 months. The value of this at 0.4 kroner per kilogram is approximately 27,000 kroner or £1,500.

The total yield from the million plaice in two years is therefore in round figures £2,000.

E. S. Russell.

Likewise at Lowestoft, on November 4th to 9th, there was a meeting of experts to consider the standardisation of methods to be employed in Herring investigations. The following is the report of the Committee:—

Meeting of Herring Experts.

Held at the Fisheries Laboratory, Lowestoft, England, November 4th to 7th, 1930.

Convener: Dr. E. S. Russell.

Representatives attended from the following countries. A list of those who took part in the discussions is to be found in Annexe C.

Belgium	Holland
Denmark	Irish Free State
England	Norway
France	Scotland
Germany	Sweden

Proceedings.

Professor E. Ehrenbaum was unanimously elected Chairman for the duration of the meeting.

I. Methods of Sampling.

A discussion took place during which members of the Committee communicated the methods used in their respective countries.

It was agreed that the method of sampling depended entirely on the local conditions of the fisheries concerned and that no standard rules could be laid down.

Mr. H. J. B. Wollaston stressed the importance of the study of selection by drift nets (Journal du Conseil, Vol. II, No. 3, 1927).

It was agreed that each country should investigate this problem as opportunity arose.

It was agreed that comparisons should be made when practicable between samples taken by drift nets and other nets (e. g. Purse seines).

II. Methods of Measurement and Publication of Measurement.

The Chairman pointed out that in accordance with the original resolution of the Council[1]) measurements should be taken to the "centimetre below".

After full discussion the Committee decided to recommend that:—

1) Herring should be measured to the unit below, and that a correction of + 0,5 units should be added to such standards as the mean, modes etc., in publication.

[1]) Rapports & Procès-Verbaux No. I p. 93.

2) The longest measurement of the fish should be used (i. e. from the snout to the end of the longer fluke of the tail when extended along the middle line of the fish).
3) Any departure from the above methods should be mentioned in the publication concerned.

III. Uniform description and denomination of the various stages of sexual maturity.

After full discussion the Committee decided to recommend that:—

1) Hjort's scale of maturities (Publication de Circonstance No. 53) for the herring should be used, Stage I being reserved for virgin fish with gonads still in the resting stage and Stage VII for recently spent fish not yet showing definite signs of recovery, Stage VIII indicating recovering spents with traces of intestinal fat. Stage II is the condition in development between either Stages I and III or Stages VIII and III and hence as far as possible Stage II should be subdivided to distinguish maturing virgin fish (I) II from previously spent fish again in the ripening stage (VIII) II.
2) The quantity of fat associated with the intestine should be taken into consideration as an index of the degree of maturity especially in doubtful cases. The degree of fattiness may be used as an aid in distinguishing maturing virgin fish and recovered spents at Stage II. Up to Stage III there is usually much fat which gradually disappears at Stages IV and V.

Note. As there is no sharp line of demarcation between the different stages of maturity it was suggested by Mr. Farran and Dr. Bowman that greater uniformity in classification would be secured by ascertaining the proportional weight of the gonads to total body weight i. e. K of gonad $\left(\frac{\text{gonad}\times 100}{l\,3}\right)$. The limits within which each maturity stage falls should be defined. A provisional equivalent to the recognised stages was suggested (I under 0,5, II 0,5—3, III 3—7, IV 7—11, V over 11). In practice the proportional weights of the gonads of a small number of fish in the sample would be determined, placed in the appropriate maturity scale and these would serve as a guide for the classification of the rest of the sample.

The above method should also be used in conjunction with that of Dr. Johansen for stages in which the average diameters of the eggs are determined.

IV. Uniform description and denomination of sexes especially in immature and spent forms.

This subject was considered under item III.

V. Age determination; method and form of interpretation and publication.

After full discussion the Committee decided to recommend that:—

1) Scales or otoliths should be used for age determination according to circumstances.
2) Both the number of growth zones and the number of winter rings should be stated in all publications. When year-classes are given the author should state how these are deduced.

VI. Determination and utilisation of L_1 from scale readings and otoliths.

Mr. Hodgson demonstrated how valuable results could be obtained by the method of analysing the data into frequency curves, as opposed to the use of the arithmetic mean (Journal du Conseil, Vol. IV, No. 2, 1929 and Fishery Investigations, Series II, Vol. XI, No. 7, 1929).

Mr. Hodgson further suggested that the countries represented should carry out investigations on these lines in their own areas, or alternatively send him scale material to work up.

VII. Value of race investigations.

VIII. Characters to be used in race investigations.

The Chairman communicated to the meeting an abstract of Dr. Schnakenbeck's paper on racial investigations. The Committee expressed their appreciation of the immense work carried out by Dr. Schnakenbeck.

Considerable discussion took place from which it became evident that two opposed views were held as to the interpretation of the data in possession of the various workers, but it was agreed that the question could not be adequately discussed before a closer study had been made of Dr. Schnakenbeck's completed work (issued in the mean time[1])).

It was suggested that in conjunction with further racial investigations, especially on spawning shoals, the L_1 values should also be ascertained.

IX. Proposals for collaboration between the countries concerned in stating the inter-relationship between drift-caught and trawl-caught herring.

The Committee decided to refer this question to a Sub-Committee consisting of Mr. W. C. Hodgson, Mons. J. le Gall, Dr. H. Lissner, Dr. J. J. Tesch and Mr. H. Wood, who co-opted Mr. T. Edser.

The Sub-Committee after its session recommended that:—

The International Council should be in possession of as complete data as possible on the biological similarities and differences between drift-caught and trawl-caught herring, in order that it should be in a position to advise in the event of the matter being raised by the commercial interests concerned.

The Sub-Committee further recommended the adoption of a co-operative programme of research drawn up by them (Annexe A).

The General Committee decided to endorse the recommendations of the Sub-Committee.

X. Proposals for an international programme of relevant hydrography and plankton and larval research.

During the discussions Professor G. Gilson outlined to the meeting the Belgian programme which included work on hydrography, plankton and fish larvae on a line

[1]) Zeitschr. f. wissenschaftl. Biologie Abt. A. Bd. 21, 3/4 Heft S. 409—566, Berlin 1931.

Deal—Gravelines. This programme should be of extreme value in a co-operative programme such as suggested (Southern North Sea Committee, Recommendation 1 (1930) and Davis — Annexe B).

Distribution of larvae.

After full discussion the Committee decided to recommend that:—

1) An International programme of co-operative research on the distribution of herring larvae be initiated as soon as possible.
2) Before the details of such a programme are arranged it is essential that methods of collecting larvae should be thoroughly tested by the countries concerned. (Gardiner, — Annexe B).

Plankton.

It was suggested that in addition to the programme of larval research a further programme of general planktonic research should be carried out in order to attempt to correlate the concentrations of herring shoals with environmental conditions, as a check on fishery predictions based entirely on probable composition of stock.

During the discussion Professor A. C. Hardy gave a description of his continuous plankton recorder and offered suggestions whereby continuous records along specified sections could be made throughout the year. The Committee were of the opinion that Professor Hardy had initiated a new and valuable method for studying the plankton, the results of which would add considerably to those obtained by other methods.

The Committee decided to recommend that:—

1) A general International programme should be initiated when opportunity arose.
2) The Council should favourably consider the inclusion of Professor Hardy's scheme in the International plankton programme.

Hydrography.

Dr. J. N. Carruthers referred to Resolution No. 7 of the Southern North Sea Committee (1930) suggesting that the continuous current investigations carried out on the Varne Light Vessel might be extended so as to embrace light-vessels on both sides of the Southern Bight. In this connection he asked the members present to communicate to him as soon as possible the names of the wooden light-vessels, if any, under the jurisdiction of their respective countries.

Mr. J. R. Lumby pointed out that there was already in existence machinery for fairly complete weekly sampling of the surface salinity and temperature of the North Sea and English Channel.

No further recommendation was therefore made.

XI. Statistics.

On the proposal of Mr. G. T. Atkinson the Committee decided to recommend that:—

It is desirable that data with regard to the herring fishery, similar to those published in the Bulletin Statistique Vol. I, should again be made available, together with any additions that may be possible owing to the improvements that have been made in the collection of herring statistics.

It is particularly desirable to show the quantities landed from the various fishing grounds, and also the relation between fishing power expended and quantities taken.

Material.

Professor G. Gilson offered to place at the disposal of other workers age-determination material obtained in the course of his work.

Chairman's concluding remarks.

In his concluding remarks the Chairman expressed his conviction (which was endorsed by those present) that this meeting had been of great value in bringing into personal touch workers from the various countries and affording them the opportunity of a free exchange of views, especially on matters on which they were not in agreement.

He desired to express on behalf of the visiting experts their appreciation of the manner in which the arrangements for the meeting had been carried out by the Convener and the members of the Fisheries Laboratory, Lowestoft, and to Mr. G. T. Atkinson for his good offices in arranging and personally conducting a tour to Yarmouth.

The Meeting terminated with a hearty vote of thanks to the Chairman.

After the Sessions each day demonstrations were given by experts from each country on their methods of obtaining and treating biological material.

Before and during the meeting typescript documents were circulated to those concerned at the appropriate time. Copies of these are filed at the Fisheries Laboratory, Lowestoft, and at the Office in Copenhagen, and a list is attached (Annexe B).

(Signed) E. Ehrenbaum.

Annexe A.

Programme of research on Herring Trawling suggested by Sub-Committee and endorsed by Committee.

Areas affected.

1) Fladen Ground
2) Gut
3) Dogger Bank

} German.

4) Dyck or Sandettie. — French and Belgian.
5) Start Point to Plymouth. — French.
6) Smalls. — Belgian, English, French.
7) Klondyke. — British, French, Belgian and few German.

Relationship between different methods on each area should be stated (e. g. on the Fladen Ground there is generally no interference between trawling and drifting methods).

Methods of Investigation.

1) Samples to be taken from drift and trawled herrings from adjacent, or, if possible, identical areas.
2) For each fishery (trawled and drift) the following data should be published:—
   a) Percentage of each year-class.
   b) Percentage of each maturity stage in each year-class.
   c) Other salient features.
3) The following data to be procured from the dominant year-class for each fishery. The minimum sample of this dominant year-class to be 250.
   a) Length frequencies.
   b) Length L_1. Frequencies to cm. below.
   c) Vert. *S*. Numbers with percentage frequencies.
4) Reference to data and place of capture to be given in dealing with samples, generalised or preconceived terms such as Bank herring etc. being avoided.
5) It is considered highly desirable that an attempt should be made to relate expenditure of fishing power to catch. Each country should delineate fishing grounds, and supply information regarding type of vessel, dimensions of gear and times of fishing.

Reporting.

A central institution for collating data and reporting should be fixed by the Council. It is urged that this work should commence in 1931.

Annexe B.

Memoranda on Methods of Herring Research.

Belgium:	Professor G. Gilson,
Denmark:	Dr. A. C. Johansen,
England:	Mr. W. C. Hodgson,
France:	Mons. J. le Gall,
Germany:	Professor E. Ehrenbaum,
Holland:	Dr. J. J. Tesch,
Irish Free State:	Mr. G. P. Farran,
Norway:	Dr. S. Runnström,
Scotland:	Mr. H. Wood,
Sweden:	Dr. K. A. Andersson.

Other Memoranda.

General Suggestions for Co-operative Research — Mr. F. M. Davis.

Notes on the difference of capture of larval Clupeids by day and by night — Mr. A. C. Gardiner.

Notes on Herring Research being undertaken at University College, Hull, with particular reference to the new continuous plankton recorder — Professor A. C. Hardy.

Notes on oblique hauls with large Ring Nets — Mr. F. S. Russell.

Note on article, p. 207, "Journal du Conseil", Vol. IV, No. 2, 1929 — Mr. H. J. B. Wollaston.

Annexe C.

The following took part in the discussions. The official expert from each country is marked thus *.

Dr. K. A. Andersson*,
Mr. G. T. Atkinson,
Dr. A. Bowman,
Dr. J. N. Carruthers,
Mr. F. M. Davis,
Mr. T. Edser,
Professor E. Ehrenbaum*,
Mr. G. P. Farran*,
Mr. E. Ford,
Professor W. Garstang,
Professor G. Gilson*,
Mr. W. C. Hodgson*,
Mons. J. le Gall*,
Professor A. C. Hardy,
Dr. H. Lissner,
Mr. J. R. Lumby,
Professor W. Mielck,
Dr. E. M. Poulsen*,
Dr. S. Runnström*,
Dr. E. S. Russell,
Dr. J. J. Tesch*,
Mr. E. E. Watkin,
Mr. H. J. B. Wollaston,
Mr. H. Wood*.

A meeting is being held in Helsingfors for the purpose of undertaking investigations regarding the Carbonic Acid Factors in Sea Water.

Five-yearly periods of adhesion to the Council.

At the request of the Bureau the Danish Foreign Office invited all Governments now represented on the Council formally to declare their continued adhesion to it after the 21st July 1931 for a further period of 5 years at the present standard rates of contribution and subject to the existing statutes governing the constitution and proceedings of the Council. With exception of Italy all Governments now represented on the Council have announced their continued adhesion to the Council after the 21st July 1931 for a further period of five years. The Italian Government has replied that they were not yet prepared to give a definite answer[1]), as the question was still being considered by the various administrations with regard to the allotment of the contribution to the interested institutions.

[1]) Since the date of the Council Meeting the Italian Government has notified its withdrawal from the Council.

Certain Governments which have recently contributed less than Kr. 10,000 per annum to the funds of the Council by agreement with the other participating Governments, have, in effect, attached to their declaration of further adhesion the condition that their contribution shall remain at the present level. It is assumed, however, that this is to be regarded only as a request for the extension of the concession they at present enjoy for a further period, and not as a repudiation of their liability to pay the full annual contribution so soon as the causes which were held to justify the concession have ceased to apply.

II. Work of the Bureau at Copenhagen.

Besides administrative work, correspondence, etc. the following work has been carried out:—

A. Publications.

Provisional Report regarding the publications issued and cost of same during the financial year 1930—31 per $^{31}/_{3}$ 1931.

Series	Volume and Subject	Author	No. of copies	Cost Kr.	Remarks
Rapports & Procès-Verbaux	LXVI. Procès-Verbaux		800	3 419.62	
—	LXVII. Reports of the proceedings of a special Hydrographic Meeting		800	2 244.40	
—	LXVIII. Fluctuations in the abundance of the various year-classes of food-fishes		800	2 182.35	
—	LXIX. Statistiques biologiques et considérations sur la population harenguière de la Manche Orientale et du sud de la Mer du Nord	J. le Gall	800	334.50	
—	LXX. Rapport Atlantique 1929		800	2 983.25	
—	LXXI. Transition Area Report		800	2 740.75	
—	LXXII. North Western Area Report		800	2 447.85	
—	LXXIII. Untersuchungen an Salmoniden	H. Henking	800	3 392.90	
Bulletins	Bull. Hydrographique 1929		800	4 872.75	
—	Offprints of Bulletin Hydrogr. 1930, March		50	74.00	
		To carry forward...		24 692.37	

Series	Volume and Subject	Author	No. of copies	Cost Kr.	Remarks
		Brought forward...		24 692.37	
Bulletins	Offprints, April & May		50	135.75	
—	— June		50	36.50	
—	— July		50	35.75	
—	— August		50	46.50	
—	— September		50	35.40	
—	— October		50	113.25	
—	— November		50	55.50	
—	— December		50	56.25	
—	— Jan. 1931		50	92.00	
—	— Febr. —		50	56.25	
—	Bulletin Statistique		800	2 325.00	
—	Résumé Planktonique	C. H. Ostenfeld	800	2 191.50	
—	Cartes synoptiques trimestrielles donnant la température et la salinité de l'eau de surface de l'Océan Atlantique Nord	O. Pettersson	800	1 738.50	
Journal du Conseil	Vol. V, No. 2		750	2 928.95	Cost includes fees to contributors, translations, blocks etc.
	Vol. V, No. 3		750	3 995.90	
	Vol. VI, No. 1		750	3 088.95	
		Total...		41 624.32	

Other costs of Publications:—

Distribution	4 210.42
Translations, etc.	2 443.00
Grand Total...	48 277.74

B. Hydrographic Department.

The work on which the Service Hydrographique was engaged in the past year was:

1) Preparation of the manuscript of the Bulletin Hydrographique and publication of proof-prints of the material according to the scheme adopted.

Material received before the 10th of any month has usually been sent out as proofs about the last day of the same month. Some hydrographical material, e. g. the observations from lightships and the observations of sea-level, has been retained some time before being sent out as proofs in order to reduce the cost of the proofs.

2) Publication of the Bulletin Hydrographique for 1929.

3) Elaboration of temperature charts for the North Sea according to the resolution of the Council on this subject (see Rapp. et Proc.-Verb. Vol. LXVI p. 64 Rec. 3).

The work is ready to be laid before the Hydrographical Committee for the decision of some technical questions, including that of the format.

4) The working up of the salinity material for the North Sea has been continued according to the resolution of the Council of last year (see Rapp. et Proc.-Verb. Vol.LXVI p. 64 Rec. 2).

The work is now so far advanced that it will be necessary to submit certain questions for the decision of the Sub-Committee on Salinity Normals according to the Resolution mentioned above.

5) The Department has assisted in the publication of Rapport Atlantique 1929.

6) The Department has been in continuous contact with various institutions and persons by correspondence.

C. Statistical Department.

The Bulletin Statistique for the year 1928 was published in June 1930 and work on the Statistics for 1929 has been carried on during the year 1930—31; but as material has not yet been received from all the participating countries the Statistics for the year 1929 cannot be finished before the month of June this year.

Reports of Area Committees.

NORTH-EASTERN AREA
1930.

By

Oscar Sund (Vice-Chairman).

All countries represented on the Committee have, through the respective members, been asked to supply information on their country's participation in investigations touching our area, and, all having replied, positive information on work done or papers published has been supplied by the following countries:

England (Ministry of Agriculture and Fisheries),
Germany (Staatl. Biologische Anstalt, Helgoland),
Norway (Fiskeridirektoratet, Bergen,
Biologisk Laboratorium, Oslo,
Norges Svalbard- og Ishavsundersøkelser, Oslo,
Geofysisk Institut, Bergen,
Biologisk Station, Trondhjem,
Tromsø Museum, Tromsø),
Scotland (Fishery Board for Scotland).

In addition some information is given on the investigations organised by Russia in the Barents Sea, the details having been kindly supplied by the Murman Station (Aleksandrovsk) of the State Oceanographical Institute (Moskow).

England.

Mr. J. A. Robertson, of the Lowestoft Laboratory, undertook a voyage to Bear Island on a Hull steam trawler, during July and August 1930. The catch was composed almost entirely of medium-sized cod; halibut were fairly plentiful in places, long-rough dabs (*Drepanopsetta platessoides*) being the only other flat fish. Some (large) spotted catfish (*Anarrhicas minor*) were taken in almost every haul together with occasional blue catfish (*A. latifrons*). Haddock and Norway haddock (*Sebastes norvegicus*)

appeared in some hauls. Coalfish were rather scarce. Rough records of the quantity caught in each haul were obtained from the master of the vessel.

About 2180 cod were measured, scale-samples being taken from about 400 of these. Some 75 haddock were scaled and measured.

Samples were taken of the stomach-contents of cod, haddock and spotted catfish. Sample gonads of cod were preserved in formalin.

A collection of bottom fauna from the trawl was made and three vertical plankton hauls were taken. Some external parasites were obtained from halibut and Greenland shark.

Ten salinity samples and surface temperatures were taken (at ten mile intervals, starting 160 miles along a course N. by E.$^1/_2$E. from a point 69°47′ N. and 16°15′ E.) as Bear Island was approached. Three other salinity samples and surface temperatures were taken on the fishing-grounds, and two more at distances of 25 and 50 miles along the homeward course (SSW.). In addition the surface temperature was recorded at each haul. A reversing bottom-thermometer was attached to the lead-line, but as it did not work well, only a few readings of bottom temperature were obtained. Depths were recorded and the bearing and approximate distance from Bear Island were verified when possible. A series of photographs was taken.

The cod measurements gave the following figures, expressed as the number of fish falling within each 5 cm.-group. (The mid-point of the group 60—4 is 62.5 cm., of the group 75—9 is 77.5 cm. and so on).

cm-group	15—9	20—4	25—9	30—4	35—9	40—4	45—9	50—4	55—9	60—4	65—9	70—4	75—9	80—4	85—9	90—4	95—9	100—4	105—9	120—140	Total fish
No. of Fish..	1	1	5	21	42	78	61	81	91	222	283	450	411	235	140	98	28	11	7	3	2269

Germany.

The investigations inaugurated at Wesermünde on fish landed from the Barents Sea, mentioned in last year's report, have been continued. They have been extended through voyages undertaken by two members of the staff of the Biologische Anstalt of Heligoland in two trawlers, both fishing in the Kap Kanin area although not on the same grounds. The first of these voyages (Dr. Lundbeck of Wesermünde) was made between the 24th August and the 19th September, the second (Dr. Bückmann of Heligoland) from the 3rd to the 27th September. Both voyages were fruitful in observations on the fishing conditions and on the fish and their food etc. Occasionally also surface observations of temperature, plankton etc. were made. The material from these voyages (measurements, age determinations etc.) will, together with the investigations hitherto carried on in the fish market, form the basis of a report, now in preparation, on the results gained in 1929 and 1930. When this report is completed it is to be hoped that a more definite programme for further work can be framed. No doubt much work of a more detailed character, some of which can only be done at sea, should be undertaken.

The voyages in trawlers will therefore be continued as soon as possible, and the first of these is planned for the spring of the present year. As to the plans for a cruise of the "Poseidon" in 1932, mainly directed to the questions of ripeness and spawning, no decision can yet be arrived at.

The market investigations at Wesermünde in 1930 do not only include landings from the eastern and western Barents Sea but to a great extent also from the Bear Island area where the fishing was good in both of the last two years.

In all 25 landings were treated, including measurements of 32,363 fish. The corresponding data were as far as possible taken directly from the ships' log.

The number of fish samples treated in the fish market was: 9 from Bear Island, 3 from the W. Barents Sea (mainly Skolpen bank) and 13 from the Kanin area. The following numbers of fish of the different species were measured; in some cases age-determinations were made (figures in brackets):

	Barents Sea proper	Bear Island	Total
Cod	10,859 (286)	5,184	16,043
Haddock	10,875	1,836	12,711
Plaice	517 (7)	—	517
Catfish	298	198	496
Saithe	86	289	375
Norway Haddock	132	96	228
Drepanopsetta	101	—	101
Halibut	—	76	76
Total...	22,868 (293)	7,679	30,547

In addition, Dr. Bückmann measured at sea in the eastern Barents Sea: 367 cod, 1,090 (157) haddock and 359 (70) plaice. During summer most of the fishing was done near Bear Island. The catches fell off in the autumn but improved later though during the last part of the year only a few ships were fishing there. The fishing at Kanin started in August. At first big catches of haddock, with a few cod, were made, but later the cod also became more numerous. Farther to the west, in the Skolpen bank area the catches were apparently less than in the corresponding season of the preceding year.

The table on page 129 gives an idea of the size and also of the comparative density of cod and haddock on the grounds, the figures being calculated as number of fish in each 5 cm.-group per voyage of from 22 to 25 days duration.

The available data do not show how far the variations recorded in the quantity of cod and haddock were real and how far they were caused by different modes or degrees of migration. At present the question of these migrations must be considered the most important issue in this field, as a reliable method of estimating the condition of the stock will be possible only when this question has been elucidated.

German publications relating to the North-Eastern Area in 1930:

Schulz, Br. Die Hydrographie des Barentsmeeres. Journal du Conseil, Vol. V, Nr. 3, 1930.
Lundbeck, J. Biological-Statistical Investigations of German Catches in the Barents Sea in 1929. Rapp. & Proc.-Verb. LXVI, p. 94, 1930.

5 cm. group	Cod						Haddock					
	Skolpen Bank		Cape Kanin		Bear Island		Skolpen Bank		Cape Kanin		Bear Island	
	Oct.-Dec.		Oct.-Dec.		1930		Oct.-Dec.		Oct.-Dec.		1930	
	1929	1930	1929	1930	July-Aug.	Oct. Dec.	1929	1930	1929	1930	July-Sept.	Oct. Dec.
31— 35.....	..	..	..	..	..	..	42	21	59	..	514	..
36— 40.....	31	3	..	..	..	29	1,085	396	384	2	1,548	39
41— 45.....	164	36	2	5	..	349	2,537	1,387	629	26	2,501	46
46— 50.....	360	145	18	16	356	1,283	3,348	1,528	1,351	157	3,005	69
51— 55.....	726	224	45	34	1,593	1,539	3,300	833	2,226	525	1,837	168
56— 60.....	818	291	102	94	3,445	1,511	3,524	819	4,844	2,145	739	481
61— 65.....	729	331	274	205	6,195	1, 869	4,251	11,935	5,172	5,022	945	2,252
66— 70.....	578	363	598	456	7,544	2,552	2,996	2,048	4,283	4,920	607	4,255
71— 75.....	437	316	1,060	821	6,718	2,930	1,477	1,820	1,977	1,942	197	3,876
76— 80.....	286	246	1,153	1,048	4,858	2,317	718	1,091	1,228	392	66	1,256
81— 85.....	401	333	1,259	1,275	3,141	1,153	139	496	161	48	10	445
86— 90.....	356	444	991	1,207	1,428	506	12	82	13	21	2	..
91— 95.....	386	362	616	617	322	265	..	6	..	..	..	..
96—100.....	278	278	254	213	135	117	..	..	..	..	..	..
101—110.....	161	333	83	44	10	68	..	..	..	..	..	..
111—120.....	36	24	2	3	20	28	..	..	..	..	..	..
121—140.....	15	4	..	..	10	31	..	..	..	..	..	..
Total...	5,762	3,733	6,457	6,038	35,775	16,547	23,429	12,462	22,327	15,200	11,971	12,887

Norway.

Fiskeridirektoratet (the Bureau of Fisheries, Bergen) worked mainly along the same lines of research as in the preceding year although some increase may be noted in the number of observations as well as in the extension of the area of observation. This refers mainly to the cruise of the s/s "Sotra" to the Jan Mayen area on a mixed oceanographical and fishing expedition and to the cruise of the "Johan Hjort" from Bergen to W. Finmark in the autumn with the object of observing the occurrence of the fry of cod and other fish (coalfish, plaice etc.).

The following vessels were employed by the Bureau of Fisheries:—

1) The research cutter "Johan Hjort" which was in commission from the 8th of February to the 17th of December, mainly on oceanographical and plankton cruises along the northern coasts during the periods of the great fisheries but also on shorter cruises on the West Coast with the object of supplying information on the eel, plaice and sprat fisheries, the spawning of the herring, and, as mentioned above, the relative occurrence of young fish along the shore from Bergen to Finmark.
2) The steam liner "Sotra" was hired and kept in use from the beginning of April to the end of September. She was used for fishing experiments and oceanographical work in the Bear Island, Spitsbergen and Jan Mayen areas.
3) The small motor cutter "Arnulf" was hired for a short trip on the West Coast in June in connection with investigations of the sprat.

The following table gives the particulars of the Oceanographical observations:

Vessel, cruise No.	Area	Period	Observers	Number of Stats.	No. of Observations on					
					$T+S$	O'_2 [1])	O''_2 [1])	NO_3	P_2O_5	p_H
"Johan Hjort" I	Bergen-Stavanger.	$^{8}/_{2}$—$^{11}/_{2}$	Iversen.....	3	32	..	..	..	..	..
— II	Bergen-Lofoten...	$^{27}/_{2}$— $^{2}/_{5}$	Sund, Eggvin	119	1,093	338	287	852	617	653
— III	West Coast.....	$^{7}/_{5}$—$^{16}/_{5}$	Bjerkan....	20	147	..	..	14	14	..
— IV	Bergen-Finmark..	$^{26}/_{5}$—$^{16}/_{7}$	Sund, Wilh..	96	953	383	367	422	630	628
— V	West Coast.....	$^{28}/_{8}$—$^{26}/_{9}$	Bjerkan....	36	345	..	..	..	..	..
"Sotra" I	Tromsø-Spitsb....	$^{22}/_{4}$—$^{15}/_{7}$	Iversen.....	142	921	62	..	55	53	..
— II	Halten-Jan Mayen	$^{29}/_{7}$—$^{18}/_{8}$		52	452	12	..	5	4	..
— III	Tromsø-Spitsb....	$^{25}/_{8}$—$^{25}/_{9}$	Koefoed....	99	835	45	..	35	29	..
"Arnulf"	West Coast.....	$^{11}/_{6}$—$^{18}/_{6}$	Bjerkan....	11	55	..	..	..	..	..
				578	4,833	840	654	1,383	1,337	1,281

[1]) O'_2 = oxygen in cc. pr. l.; O''_2 = do, after storing 3 weeks.

Marking Experiments. Three small marking experiments were made in 1930. 1) At Andenes, at the northern extremity of the island Andøy in lat. 69°20′ where the continental shelf is only 5 miles wide, about 900 spawning cod were marked. The fish were line-caught and liberated immediately after marking. The recapture percentage in the first year was only about 5 although precisely the same method when employed at a position farther south in 1928 (lat. 63°30′) gave 26 %. Most of the recaptures were made in the West Fjord showing a southward migration during the same spring. 2) At Jan Mayen, 113 cod, by the "Sotra" Expedition. No recaptures have been recorded. 3) At Bear Island, 68 halibut, by the "Sotra" Expedition. Of these seven were recaptured near the marking place. (Of the 35 halibut marked at Bear Island in 1929 four were caught in that area and one on the Norwegian Coast near Tromsø although some doubt is attached to the place where this fish was captured.)

Fish Population Records. In 1930 the stocks of the most important food fish were measured in the same way as before. The introduction of the method of measuring invented by Prof. D'Arcy Thompson has made possible a considerable increase in the number of big fish (cod, haddock, saithe) measured. The total number of fish measured was not far from 160 thousands. The following table shows the number measured in each category:

Species	Area	Period	No. measured
Cod (spawning)	Lofoten and N.	February—April	75,645
—	South Norway	—	2,024
(feeding)	Finmark	May—June	25,939
—	Bear Island—Spitsbergen	May—August	14,291
—	Jan Mayen	August	382
(migr. S.)	West Finmark	December	3,885
Haddock	East Finmark	May—June	8,579
	West Finmark	September—October	1,793
Saithe	West Finmark	September—October	14,868
Herring (spawning)	West Coast	January—April	5,456
(fat)	N. districts	July—December	1,180
Sprat	West Coast	April—November	6,284
Plaice	Finmark	September—October	2,528

The University of Oslo. The investigations of the biological and oceanographical conditions in the area off Møre and outside the coast, organized by Professor Johan Hjort with the whaling station at Aukra as a base and carried on according to the same plans annually from 1926, were continued in 1930 by Professor H. H. Gran, Mr. Trygve Braarud and Mr. Alf Klem. The non-biological observations will be published in the near future by Braarud and Klem. The remaining material will be studied in connection with the observations to be made on the same plans in 1931.

The investigations were based on a series of stations along a line running from the inner part of the Romsdal Fjord to the edge of the continental shelf, "Storeggen". Three cruises were made in the m/c "Morild":

1) 14th—15th March,
2) 4th— 5th April,
3) 12th—13th May.

At all stations the following oceanographical elements were investigated: temperature, salinity, p_H, nitrate, phosphate and oxygen at all depths from the surface to the bottom or to a depth of 400 m. The amounts of ammonia, nitrite and iron present in some water samples from different levels were estimated.

Water samples for quantitative determination of phytoplankton were collected at all stations from the usual levels between 1 and 75 m. (incl.), and vertical hauls were taken with zooplankton nets with special regard to the capture of copepods and euphausids.

Geofysisk Institut, Bergen. The work at sea with the research vessel of the Institute, the "Armauer Hansen", included a current measuring expedition to the area west of the Iberian Peninsula and Marocco during June and July. Before and after that time the vessel was used for oceanographical investigations in the fjords on the West Coast and for one section across the Norwegian Channel west from Feie on the 18th of August. In the period between the 8th and 17th of September current measure-

ments were made at different points in the fjords. The other cruises were occupied with salinity and temperature determinations, starting on the following dates: January 30th, May 11th and 22nd, August 19th and December 8th. In all 58 stations comprising about 800 observations of T and S were taken.

Norges Svalbard- og Ishavsundersøkelser. During the Bear Island and Spitsbergen expedition in 1930 five oceanographic sections were made by means of the s/s "Michael Sars" between the 2nd of June and the 8th of July in the waters around Bear Island and along the course from Hammerfest to the South Cape. All sections radiate out from Bear Island approximately along straight courses in the following directions: I. in 180°, II. in 270°, III. in 340°, IV. in 50° and V. in 130°. (The directions are given approximately, reckoned from Bear Island.)

The observations were made by Lieutenant Rolf Kjær, hydrographer to the institution.

The total number of stations was 44, involving 355 observations of temperature and salinity, from the usual levels down to 1000 m.

Sections II and IV cover distances of about 60 miles in the directions named, the other three connect Bear Island with S. Cape, N. Cape and Hammerfest respectively.

The Biological Station, Trondhjem. The Director, Mr. Nordgaard, reports:

During the autumn a cruise was made in the vessel of the station, the "Gunnerus", in the coastal waters and fjords of the Trondhjem district, the object being general biological and oceanographical studies, bottom fauna included. During the summer Mr. Dons made a study of the sea shore from Aalesund to Kirkenes (Finmarken).

Tromsø Museum, Tromsø. In 1930 the Museum started a continuous programme of monthly investigations of plankton and the oceanographical elements besides the study of littoral fish fry and bottom fauna, in the fjords and coastal waters around the town, entailing a monthly cruise in the research vessel of the Museum, the small m/c "Sparre Schneider". The investigations were started in April, 8 complete visits to the twelve stations having been made in 1930.

These 8 cruises yielded the following number of observations: T + S 676, O_2 654, O_2 (stored samples) 295, p_H 658, phosphate 519, nitrite 208. The investigations were carried on by Mr. T. Soot Ryen and Mr. Sivertsen.

Papers by Norwegian workers, published in 1930:—

Gran, H. H. The Spring Growth of the Plankton at Møre in 1928—29 and at Lofoten in 1929 in Relation to its limiting factors (Skr. utg. av Det Norske Videnskaps-Akad. i Oslo, M. N. kl. 1930, nr. 5).

Sund, Oscar. The Renewal of a Fish Population studied by Means of Measurements of Commercial Catches. Example: the Arcto-Norwegian Cod Stock (Rapp. et Proc.-Verb. LXV, 1930).

Rollefsen, Gunnar. Observations on Cod Eggs. (Ibidem).

Lea, Einar. Mortality in the Tribe of Norwegian Herrings. (Ibidem).

Bjerkan, Paul. Fluctuations in the Stock of Young Sprat off the West Coast of Norway in Relation to the Sprat Population as a Whole. (Ibidem).

Lea, Einar. Fluctuations in the Stock of Fish, Herring. (Rapp. et Proc.-Verb. LXVIII, 1930).

Bjerkan, Paul. Methods of Investigation into the Fluctuations in Sprat Stocks. (Ibidem).

Dannevig, Alf. Laks, Vekslinger i Fiske og Bestand ("Salmon, fluctuations in output and stock"). (Aarsber. vedk. Norges Fiskerier, 1929 nr. 4, 1930). (Norw.).

Bjerkan, Paul. Brislingundersøkelser 1928—29. (Ibidem, nr. 1, p. 89—103).
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Scotland.

In May the Scottish research vessel "Explorer" made hydrographic and plankton observations along the edge of the North Sea plateau from Stavanger to the North of Shetland. A few sprat larvae were caught in the Norwegian deep off Stavanger while herring larvae 20—22 mm. in length were obtained NE. of the Viking Bank and to the North of Shetland.

Length measurements and scale samples were obtained from haddock caught off the Norwegian coast (61°25′ N.) in April. The haddocks were feeding on herring spawn.

Russia.

Although Russia is not a member of the Council, it has been considered of interest to give some information on the organisation of that country's efforts in the way of fishery and oceanographic research in the Barents Sea.

The responsibility of this work rests upon the State Oceanographical Institute (Moscow) with which the Biological Station at Aleksandrovsk (Murman) has recently been amalgamated.

The programme of work completed in 1930 (and to be repeated in 1931) comprised: Marking experiments (over 4,000 cod, and a number of haddock, halibut, sebastes and anarrhicas having been liberated), racial studies of cod and haddock from all grounds in the Barents Sea (vertebrae, fin rays and cranial measurements of several thousands of fish), fishing experiments (to try different forms of trawl nets and lines, the influence of duration and kind of bait in the line fishery etc.), oceanographical cruises, partly combined with fishing experiments, fish measurements. No. of fish measured: 110,825.

In 1930 the following cruises were made:

1) Research steamer "Persei" (also trawling experiments) 11 cruises, 411 stations.
2) Trawler "Delfin" (also fishing) 12 cruises, 511 stations.
3) Research cutter "Knipovich", 14 cruises, 192 stations only oceanographic and plankton research, including chemical properties of the sea (Phosphates, nitrates, ammonia, nitrites, oxygen, hydrogen ion).
4) Small research vessel "Savva Loshkin" (also coastal fishery experiments) 12 cruises, 102 stations.

NORTH-WESTERN AREA
1930.

By

Johs. Schmidt.

The following work has been carried out by the various countries:—

England.

H. M. Surveying Ship "Rosemary" made soundings off the N. E. quadrant of the coast of Iceland as far as the 500 fathoms line. Temperatures were observed and water samples collected at 21 stations round the whole coast in the period June 13—21 and repeated twice more at some positions during the periods July 3—9 and July 18—24.

France.

Investigations of the fishery on the banks to the west of Greenland were continued by Commandant Beaugé (*vide* Scientific Report of the North Western Area Committee. Rapp. & Procès-Verbaux LXXII, 1931). At Iceland M. Le Gall undertook an investigation of the fishery and has given a comprehensive report on the subject. (J. Le Gall: La Pêche en Islande (Rapport de mission), Revue des Travaux de l'office des pêches maritimes No. 11, Tome III, Fasc. 3. 1930.)

Germany.

1. Hydrographical investigations were carried out in the Denmark Straits with the "Meteor". The following report on the subject by Prof. A. Defant has been sent in by the German member of the Committee, Prof. Dr. E. Ehrenbaum:—

The "Institut für Meereskunde", last summer, resumed and finished the investigations started in 1929 in the area of the Denmark Strait and the Irminger Sea. The cruise began on July 16th and lasted till Aug. 28th. The following took part: Professor Defant and Dr. Böhnecke of the "Institut für Meereskunde", Berlin, Professor Schulz of the "Deutsche Seewarte", Hamburg, Professor Weickmann of the "Geophysikalisches Institut", Leipzig, the last for making aerological investigations. During the cruise altogether 27 oceanographical stations were made and 490 corresponding observations of temperature and salinity taken. The number of oxygen analyses made was 380; the content of nutritive substance (Phosphate and Nitrate) was determined at 128 positions. Further, the surface plankton from 30 stations was preserved for working up. Samples were also taken for the determination of alkalinity. Thus, for the whole area, besides numerous surface observations, altogether 58 oceanographical stations are

at disposal, permitting a close investigation of the East Greenland current and its junction with the Irminger current. The echo soundings made during the cruise give a correct survey of the bottom of the whole area; especially do they permit an accurate investigation of the connection of the Reykjanes ridge with the Atlantic slope. The material is being worked up at the "Institut für Meereskunde" in Berlin.

2. Measurements and age determinations of fish landed from Iceland were carried out at Wesermünde; the following report on the subject by Prof. W. Mielck has been sent in by the German member of the Committee, Prof. Dr. E. Ehrenbaum.

The German co-operation was confined to statistical investigations, measurements and age-determinations of the trawler catches from the waters round Iceland landed in Wesermünde. This work was done by the scientific assistant of the Heligoland Biological Station at the Institute for Sea-Fishery in Wesermünde (Dr. J. Lundbeck).

In the spring, some of the record cod catches were investigated. During the autumn, the trawlers landed only a very few cod and haddock, but great numbers of coalfish and Norway haddock from East Iceland.

Special attention was given to the Norway haddock. This fish is often landed non-gutted; the weight differences of non-gutted and gutted fish were ascertained. Further, the number of big individuals was taken. This gave the astonishing result that besides the usual fish of 40—50 cm. length, big ones of more than 70 cm. (a few only) occurred while the lengths in between were almost entirely lacking.

In the autumn, the trawlers caught off East Iceland some isolated *Lycodes esmarkii* which also is sometimes brought to the market.

The age of about 700 cod was determined.

The number of measurements made of the 17 catches investigated is the following:—

Haddock	3,743
Cod	3,076
Norway haddock	2,825
Coalfish	1,532
Lemon Dab	1,231
Plaice	176
Halibut	53
Other species	1,805
	14,441

Norway.

In 1930 no work was done in the North-Western Area. In 1929, in addition to what is mentioned in the Administrative Report for that year, the following collection of data was made (the report was received on February 6th, 1931).

A voyage undertaken in the summer of 1929 by mag. sc. Johan T. Ruud and cand. real. Braarud, on the initiative of Professor Johan Hjort, in the sealer "Øst" was unfortunately not mentioned in last year's report. The plans of the voyage, which could be realized only through the courtesy of the shipowners, Henriksen and Strømmen,

of Aalesund, included an oceanographical section from the West Coast of Norway to the ice edge in Denmark Strait besides vertical hauls with zooplankton nets. Heavy weather prevented more than one station being made on the voyage west which commenced at Aalesund on the 1st of June, but from the 9th of June to the 18th of August 1927 complete stations were made within the drift-ice covered area, from lat. 65°30′ to 67°45′, partly in very dense ice, and during the return crossing to Norway (21st to 25th August) 5 stations were worked. The oceanographic observations included at all stations salinity, oxygen, phosphate, nitrate, pH, and phytoplankton and zooplankton by vertical hauls. All chemical analyses were made at once by Braarud and Ruud. Some observations were also made on the hood seal, the cod and the Greenland shark. These observations are now being worked up by Ruud and Braarud.

Scotland.

1) General Statistics of fish landed in Scotland from Iceland and Faroe for 1930.
2) Haddock measurements and scales from Faroe commercial catches landed at Aberdeen Market.

Denmark.

Collection of material for the investigation of the cod population at Iceland.

At the instance of the »Kommissionen for Danmarks Fiskeri- og Havundersøgelser«, these collections were continued in 1930 (by Dr. Å. V. Tåning and others) and were made in the months of April to July at the previously utilized centres on the four coasts of the country; there were measured, in all, about 23,000 cod, (Vestmanö 3560, Isafjord 5560, Siglufjord 7450, Nordfjord 6420), and material for age analyses was collected as before. The determinations of age in this material was carried out by Mr. Arni Friðriksson, mag. sc. On the basis of the investigations in previous years great stress was laid on the forecast of last year that year-class 1922 would play an important part in the spring fishery of 1930 and the following year; this prediction was amply verified in that the great spring fishery on the south coast consisted mainly of this one year class (to the extent of 60 per cent.); in 1929 the year-class 1922 had, practically speaking, not yet appeared in that part of the country. The significance of the year-class will appear from the fact that on the 1st July 1930 the Icelandic fishery amounted to as much as 275,000 Skippund (at about 160 lbs.) a quantity exceeding by far anything previously attained. The material for the last three years for the determination of the fluctuations of the cod population at Iceland has now been examined for age and a publication is being prepared by Dr. Å. V. Tåning.

The marking of cod at Greenland was carried out by the adviser to the Greenland fishery, Prof. Ad. S. Jensen (with the assistance of Mag. Paul Hansen); the markings were undertaken particularly in the Julianehaab district (1354 markings were carried out).

Investigations of the migrations of the herring in relation to its food were undertaken at Siglufjord, North Iceland, during July and September.

A few plaice-otoliths from Hafnarfjord were collected as in previous years (by Danish naval vessels) in order to follow the population changes in this area.

The material which up to the present has come to hand from the experiments with water bottles in 1928—29 has been prepared; a brief report has been printed in Rapports et Procès-Verbaux des Réunions Vol. LXXII.

Continuous hydrographical investigations were proceeded with at Iceland (Faxe bay) and at the Faroes.

Collection of material for the investigation of the Cod population at the Faroe Islands was continued as in previous years and age-determinations have been made by Mr. Arni Fridriksson, mag. sc. An examination of the material showed that, whereas the year-class 1925 had disappeared from the ground at Suderö where it predominated in 1928 and 1929, it now occurred abundantly on the grounds north of the Northern Islands (to the extent of about 44 per cent.); at Suderö the year-class 1927 occurred to the extent of about 56 per cent. in the catches and must be considered fairly good, corresponding in strength to the earlier year-class 1925.

Statistics of whaling at the Faroe Islands and Greenland were collected as usual.

Racial investigations of the Cod population[1]) in the North Atlantic were steadily continued and samples procured from several places where none, or only a few, were found previously. For instance material was procured from the halibut bank at West Greenland, from Angmagssalik in East Greenland, etc. The samples have been worked up and agree in the main with the previously acquired particulars regarding the populations in these regions. Further it is to be remarked that age-determinations of the sample of codlings received from East Greenland showed that it consisted almost entirely of a single year-class (year-class 1928: about 88 per cent.); it will be of some importance to discover whether this year-class is also numerously represented at Iceland.

[1]) *Vide* Johs. Schmidt: Racial Investigations. X. The Atlantic Cod (*Gadus callarias* L.) and local races of same. — Comptes-Rendus des travaux du Laboratoire Carlsberg, 1930.

PLATEAU CONTINENTAL ATLANTIQUE

1930.

(Atlantic Slope).

Par

Ed. le Danois.

Les croisières effectuées par le soin des gouvernements d'Espagne, de France, de Grande Bretagne, d'Irlande et de Portugal, se répartissent de la façon suivante:

Espagne: Sorties du navire "Xauen", en Mars—Avril, Mai, Août—Septembre.

France: Sorties des navires "Estafette" et "Sentinelle", de la Marine Nationale, en Avril et Mai.

Croisières du Navire "Pourquoi Pas?" en Août et Septembre.

Grande-Bretagne: Sorties mensuelles du navire "H.M.S. Salpa".

Irlande: Sorties du navire "Muirchu" en Mai, Août et Octobre.

Portugal: Croisières du navire "Albacora" de Juin à Août.

En plus de ces sorties effectuées par les gouvernements représentés officiellement dans le Comité du Plateau Continental Atlantique, deux importantes expéditions, celle de "l'Armauer-Hansen" de Norvège et celle du "Dana" de Danemark, sont susceptibles de fournir d'importants éléments d'investigations aux recherches du Comité du Plateau Continental Atlantique. La croisière norvégienne a été faite en liaison avec celle du navire portugais "Albacora", mais à l'heure actuelle je n'ai pu recevoir les résultats océanographiques de ces deux croisières. J'espère que les documents recueillis seront communiqués au Comité et publiés ultérieurement.

Il en est de même pour les importantes observations que le navire "Dana", au retour de son voyage autour du monde, a pu faire dans la zone de la pente atlantique. Notre collègue, M. le Docteur Johs. Sscmidt m'a promis de réserver au rapport de ce Comité une partie des résultats de ses travaux.

En plus des croisières, le Comité du Plateau Continental Atlantique a manifesté son activité par une réunion tenue à Lisbonne, sur l'invitation du gouvernement portugais en vue d'arriver à l'unification des méthodes ichthyométriques applicables à l'étude des races de sardines. Cette réunion spéciale à laquelle assistaient des experts d'Angleterre, d'Espagne, de France et de Portugal, sous la présidence de M. le Professeur Jean le Gall, expert français, a permis une mise au point nécessaire de la technique des recherches intéressant les contrées sardinières. Le compte-rendu et les décisions seront adjoints au Rapport Atlantique de l'année 1930. A tous ces travaux s'ajoutent les études entreprises conjointement par la France et la Grande-Bretagne au sujet du merlu, et que représentent les remarques effectuées par MM. Belloc et Hickling.

Dans le secteur sud, il me faut surtout signaler les premiers travaux du laboratoire espagnol des Iles Canaries, placé sous la direction de M. Luis Bellon Uriarte; ce laboratoire qui étend largement vers le sud la zone d'études du Comité du Plateau Continental Atlantique, apportera dans l'avenir, par sa position géographique une contribution de plus en plus importante à nos travaux.

1930	France	Grande Bretagne	Irlande	Espagne	Portugal	Observations
Janvier	....	....	....	....	....	....
Février	....	Salpa	....	....	....	....
Mars	....	Salpa	....	Xauen	....	....
Avril	Estafette	Salpa	....	Xauen	....	....
Mai	Estafette Sentinelle	Salpa	Muirchu	Xauen	....	Sorties périodiques
Juin	....	Salpa	....	....	Albacora	....
Juillet	....	Salpa	....	....	Albacora	....
Août	Pourquoi Pas?	Salpa	Muirchu	Xauen	Albacora	Sorties périodiques
Septembre	Pourquoi Pas?	Salpa	....	Xauen	....	....
Octobre	....	Salpa	Muirchu	....	....	....
Novembre	....	Salpa	....	....	....	....
Décembre	....	Salpa	....	....	....	....

COMBINED NORTH SEA
1930.

By

the Vice-Chairman Prof. G. Gilson acting as Chairman after the decease of Mr. David T. Jones.

We must congratulate the Chairmen of the two North Sea Committees, Dr. A. Bowman and Prof. W. Mielck, for having so ably summed up in their respective Reports an enormous amount of results, and express our thanks for their excellent work. From these bulky reports it appears that the members of the two subjoined Committees have carried on investigations very actively in both sections of the North Sea. I am not expected, as acting Chairman of the Combined North Sea Committee to analyse these two synthetical reports, both of them being circulated among the members. Under present circumstances, however, I consider it opportune to remind you that the aim of this Committee is mainly to help the two sets of workers to keep in close contact in order to obtain a more effective concentration and co-ordination of data obtained separately in the two regions, and also, sometimes, to organise meetings of specialists and even to devise plans of work for certain researches to be carried on co-operatively.

Among these latter are included investigations of certain physical and biological phenomena that encroach beyond the limits of the two districts and of the English Channel, whilst others are connected with questions of more general interest, like unification of methods of work, rules of technique, invention, improvement and standardisation of instruments, etc.

A meeting of experts in herring investigation, recommended by this Committee, was held at Lowestoft in November. That this meeting has given extremely useful results is shown in the special report given on pp. 116—122. Discussions between specialists led to the adoption of definite rules, both for work and for the interpretation and publication of results, among which the following may be mentioned:

method of sampling and of measurement,
description of stages of sexual development — Hjort's scale slightly modified and in conjunction with Johansen's in doubtful cases,
age determination from scale and otolith readings,
constant statement of the number of winter rings.

Among discussions, the most important was that on the question of races, the value of conventional racial characters, their more or less hereditary maintenance, the

limit of action of environment during the first stages, and many other points on which it is expected that light will be thrown by Dr. Schnakenbeck's very exhaustive memoir.

Beside resolutions and discussions, many proposals have been recommended at Lowestoft for co-operative study and action, among which are:

selection of herrings by drift nets and comparison of catches from the same shoal by other methods (Wollaston — Sub-Committee appointed).
proportional weight of gonads to total weight (Bowman-Farran).
frequency curves instead of arithmetic means (Hodgson).
sending of material to particular centres (Hodgson-Gilson).
international programme of research on larval fishes with relevant hydrography and plankton study (Davis).
necessity of further study of methods and instruments to be adopted for collecting larvae (Davis-Gardiner-Gilson).
correlation between feeding concentrations of herring shoals and environment,
physical and biological conditions as a check on fishery predictions based only on probable composition of stocks, — inclusion of Prof. Hardy's scheme in the international plankton programme,
continuous current investigations in the boundary region between the North Sea and the Channel (Carruthers).
preparation of special statistics for herring from all countries (Atkinson).

Beside the Lowestoft resolutions and proposals, many important questions mentioned in the reports of the Northern and Southern Committees call for active co-operation, as for instance:

haddock studies, in continuation of Dr. Harold Thompson's very important work, leading to the organisation of a regular service of prediction urgently demanded by the fishing industries of southern as well as of northern countries.
protection of young haddock by international agreement imposing a minimal size of mesh,
continuation of co-operative work with a view to the attainment of similar results for cod and even plaice and other fish, although the time for serious forecasts in the more variable conditions prevailing in the Southern North Sea does not yet seem to have arrived.
marking of fish, — besides the work involved in the experimental plaice transplantation,
food of fishes, in relation to age, length of fish, time and region.
question of the imposition of a minimal size for the landing of young fish. This long desired measure appears more than ever to be the only protective method possible in regions where an important shrimping industry is carried on in coastal waters. I am aware that the necessity for protecting young fish is now felt even among the humble populations of coastal fishermen who formerly

strongly objected to any restrictive regulation. A rather high minimal size is now applied to pleuronectids in a large portion of the Baltic region, by a recently concluded agreement between Denmark, Danzig, Germany, Poland and Sweden. We may hope that a similar regulation, with the necessary adaptation, will some day be applied to the North Sea.

Finally I submit to the assembly the proposal to alter the name of this Committee to the Combined North Sea and Channel Committee, with a view to emphasizing the fact that the study of the very important intercommunication taking place through Dover Straits is of great interest for the North Sea generally and not only for the southern part of it.

The work before the Committee covers much ground. We cannot expect to carry every point to a definite solution. It is hoped that in the course of the meetings the participation of the members will lead us to a rational selection of the matters most urgently claiming co-operative organisation.

NORTHERN NORTH SEA

By

A. Bowman.

General.

Major attention has again been given to the investigation of the herring and haddock, the two most important commercial species of the Northern North Sea. As a result of this concentration of effort with the means at the disposal of the Committee there is being built up over a series of years very definite knowledge as to the changes in the composition of these two species which is of immediate value for an understanding of the fluctuations in the practical fisheries. Much still remains to be accomplished, more particularly with regard to the correlation of these fluctuations in the year classes entering into the composition of the marketable stock with the successive changes in the hydrographical and biological conditions. The latter aspect of the problem is, however, receiving increased attention and it is gratifying to be able to record that during the year under review Germany, Denmark, France and Scotland were able to participate in the general survey of the hydrographical and plankton conditions.

Several members of the Committee attended the special meeting held at Lowestoft from 4th to 7th November which was promoted by the International Council for the discussion of the standardisation of methods of herring investigations. Various aspects of the herring problem were considered and the deliberations of this special Committee will have an important influence on future herring investigations.

In Germany the herring has again been the principal subject of study in the "Fischereibiologische Abteilung des Zoologischen Staatinstituts", Hamburg (Director, Professor Ehrenbaum). Here, the statistics of the German Herring Fishery have been worked up as before, special attention being again paid to the catches of trawled herring

and exhaustive reports concerning the year 1929 have been published — (H. Lissner: "Die Deutsche Trawlherings Saison 1929". Fischerbote 1930, S. 57—62. Jahresber. über d. Deutsche Fischerei 1929, S. 204—208).

The record yield of the German Trawl Herring Fishery in 1929 amounted to 68.2 mill. kg. which were caught on 1519 voyages. The quantity of herring caught by German trawlers in 1930 amounted to 56.2 mill. kg. only, that is, 12 mill. kg. less than in the previous year.

The fishing grounds of the German Drift Net Fishery have also been worked up from a large number of log books furnished by captains of drifters as in former years and the charts have been published — (H. Lissner: "Monatskarten z. D. Gr. Heringsfischerei 1929". Ber. d. D. Wiss. Komm. f. Meeresf. V, S. 79, 1930).

The herrings caught by the Research Vessel "Poseidon" on her experimental cruise in June and July, supplemented by samples taken from the drifters fishing in the neighbourhood of the "Poseidon", were analysed with regard to size, age, maturity, and racial peculiarities.

The analysis of the stocks of fish which form the actual basis of the German herring fishery in the western North Sea has been continued by Dr. Lissner by using samples mainly from the Altona Market and the changing composition according to year-classes established. The parallel though differing conditions prevailing in the stocks of the Fladen Ground and of the Dogger Bank are clearly shown in a paper illustrated by graphs published by Dr. Lissner in "Der Fischerbote" (Die Voraussage des Heringsfanges. Der Fischerbote 1930, S. 180—191).

In France, similar investigations on the trawl herring of the Fladen Ground have been carried out in the Laboratory at Boulogne-sur-Mer.

In Scotland, the records of all landings of herrings at each fishing port have been kept by the District Fishery Officers. The data of the number of landings by the different types of vessels and the total quantities of herrings landed have been supplemented by detailed information regarding the fishing grounds and the quality of the herrings caught. The more detailed analysis is being carried out on numerous quarter-cran samples caught by drift nets and trawls. Regular samples were procured throughout the summer herring fishery. The sudden stoppage of the fishery at Shetland in July precluded further sampling in that region. Samples of herring from Hebridean waters have also been examined. The herring shoals in the Clyde Estuary have been sampled at regular intervals throughout the year, while the shoals of the Tay and Forth estuaries have likewise been investigated during the fishing season. The data have been supplemented by the detailed examination of the material caught by the Research Vessel "Explorer" on the drift net and trawling cruises.

As in former years, the abundance and distribution of the demersal marketable species in the North Sea as ascertained from the combined English and Scottish data of the monthly landings from each unit statistical area have been tabulated by the Ministry of Fisheries (England).

Ichthyometrical data concerning 5,250 plaice, 13,616 cod, 75,897 haddock and 159 turbot collected at sea on commercial vessels in the northern area up to 31st October

have been compiled by the Ministry of Fisheries (England). The haddock measurements have been handed over to Scotland for treatment.

Age analysis of the commercial catches has been made chiefly from scale material collected in Aberdeen Market where also representative samples of the different trade categories were measured. For the relative frequencies of occurrence of the different year-classes reliance is placed chiefly on the copious scale samples from haddock caught by standard commercial otter trawl on the trawling cruises of the Research Vessel "Explorer".

France has carried out measurements and collected samples of otoliths for age-determination from catches of haddock from the northern section of the North Sea.

A large series of measurements of haddock made on board the Research Vessel "Poseidon" during her cruise in the north-western North Sea from 24th June to 15th July has also been made available for inclusion in the analysis. During the present year the continuous study of the age-composition of the haddock stock in the North Sea has been extended by the inclusion of scale material collected by the Research Vessel "Poseidon" in June from about 60 stations in the eastern part of the southern North Sea from about 55°30′ N. to 57°10′ N. and from the German and Danish coasts and at the entrance to the Skagerak on a line north of Hanstholm. The scale material has been examined at the Laboratory, Aberdeen. Similar extensive and almost contemporaneous material was also collected by the Research Vessel "Explorer" in the northern area. This is the first year in which a comprehensive detailed survey of the age-distribution of the haddock stock over the greater part of the North Sea has been accomplished within such a limited period.

Work at Sea.

France has continued the oceanographical observations in the north-western area throughout the period of the summer herring fishery from the Fishery Protection Vessels "Sentinelle" and "Estafette". In May the "Quentin Roosevelt" also carried out observations along a section from Lerwick to Copenhagen, while the drifter "Denis Papin" gave assistance with observations on the fisheries throughout the whole course of the North Sea herring fishery.

In continuation of the procedure of previous years an excursion with the German Research Steamer "Poseidon" was undertaken for the investigation of the herring in the north-western North Sea from 24th June to 15th July. The leadership was in the hands of Dr. H. Lübbert, Director of Fisheries in Cuxhaven, the principal task of the trip being to try by experimental hauls a local and seasonal extension of the trawl-herring fishery during the months of June and July. As the interests of the commercial fishery were principally concerned, one of the largest trawler companies showed themselves prepared to subsidise the enterprise by despatching on the cruise one of their most experienced captains with a full set of the best modern gear. Unfortunately, however, the trials made near the eastern and western borders of the Fladen Ground and in a more northerly region proved rather disappointing, as all of them yielded very small quantities of herrings with the trawl, though some drifters working in the neighbourhood were

able to secure quite satisfactory catches. Some steamers working with the herring trawl on the same grounds were observed to be by no means more successful than the "Poseidon". A rather slight increase of the catches could be stated to occur from the 9th of July onwards, but as the first greater landings by commercial trawlers did not occur before the end of the month of July, it was obvious that the beginning of a prosperous fishery in 1930 was fully a fortnight belated as compared with the previous season.

During the cruise of the Danish Research Vessel "Dana" in the North Sea in September—October 1930 fishing experiments with the ring trawl and hydrographic observations as to the salinity and temperature of the water were carried out in the southernmost part of the area.

As in former years, the work of the Scottish Research Vessel "Explorer" was accomplished in a series of cruises, the vessel being kept in commission from the month of February until December when she was laid up for overhaul. Routine trawling, hydrographic and plankton observations were made on all cruises, the observation stations being selected at appropriate intervals on each itinerary.

The following is a brief summary of the cruises undertaken and of the main objects of investigation on each cruise:—

February—March: General survey of the northern North Sea. Itinerary: Aberdeen — East Shetland — Viking Bank — The Patch — Fladen Ground — Aberdeen.

The distribution of the 1928 and 1929 haddock year-classes and the maturities of the progeny of the 1928 spawners.

March: Inshore investigations on the Scottish East Coast. Age-composition of the small plaice population.

April: General survey of fishing grounds on the north and west of Scotland. Itinerary: Aberdeen — Moray Firth — Fair Isle passages — Scalloway Deep — North of Scotland — Minch — Skye — Skerryvore.

Distribution of the haddock year-classes on the fishing grounds. The distribution and dispersal of the Clupeoid spring larvae. Plaice transplantation from Broad Bay to Islay.

Survey of the outer reaches of the Firth of Clyde. The distribution of the newly hatched herring larvae in the area.

May: Investigations in St. Andrews Bay. The food and feeding habits of the plaice. General survey of the northern North Sea. Comparison with similar observations in March. Itinerary: Aberdeen — Clyth Ness — Dornoch Firth — Stavanger — Viking Bank — East Shetland — East Orkney — Fladen Ground — Aberdeen.

June: Inshore investigations on the Scottish East Coast and in the Firth of Forth. Plaice transplantation from St. Andrews Bay to Dornoch Firth. Survey of the Middle North Sea, extension of the May observations. Itinerary: Aberdeen — north edge of Dogger Bank — Fisher Bank — Middle Bank — Firth of Forth.

July: Survey of the summer herring fishing grounds. Drift net experiments. Itinerary: Aberdeen — Fladen Ground — East Orkney — East Shetland — Moray Firth — Buchan Deep — Aberdeen.

August: Extension of the July survey to the north and west coasts of Scotland. Itinerary: Rattray Head — East Orkney — North Rona — Minch — Dubh Artach — Clyde.

August—September: Investigation of the prevailing conditions in the outer reaches of the Firth of Clyde west and north coasts of Scotland. Itinerary: Clyde — Stanton Bank — St. Kilda — edge of continental shelf — Flannan Isles — Minch — north of Scotland — Moray Firth.

The age-distribution of the haddock shoals on various fishing grounds.

September: Distribution of the newly hatched herring larvae on the Fraserburgh and Peterhead drift net herring fishing grounds. Search for the first bottom stages of the 1930 haddock brood.

Inshore investigations on the East Coast of Scotland and in the Firth of Forth.

October: Easterly and south-easterly dispersal of the autumn herring larvae from the Scottish coast. The first bottom stages of the 1930 haddock brood. Itinerary: Aberdeen — Middle Rough — north edge of the Dogger Bank — Brucey's Garden — Firth of Forth.

November: Survey of the north-western area of the North Sea. Age-determinations of the haddock shoals and distribution of herring larvae. Itinerary: Aberdeen — Fladen Ground — Dornoch Firth — Fair Isle passages — Lerwick — Aberdeen.

November—December: Trawling and hydrographic observations on the offshore grounds east of Aberdeen.

Inshore investigations on the Scottish East Coast and in the Firth of Forth.

On all cruises the trawling experiments were made with the commercial otter trawl with a small mesh covering over the cod-end. Supplementary trawling observations on the small plaice populations in coastal waters were also carried out by the Motor Boat "Enid". She also carried out systematic crab and lobster fishing experiments throughout the year.

In the northern area work at sea has frequently to be modified on account of unfavourable weather conditions but in the months of October and November of the year under review the exceptionally prolonged periods of stormy weather seriously curtailed the projected programmes of investigation.

During the months of May, June and October Holland carried out a series of savings trawl experiments as to the efficiency of the Gelder gear in the Northern North Sea. Ichthyometrical data were collected of all fish caught.

Haddock.

The routine work of determining the seasonal distribution, movements and abundance of the various year-classes of haddock in the North Sea, begun ten years ago, was continued throughout the whole of the present year. Progress reports as to the position of affairs have been issued from time to time. Four years ago a study of the food and feeding habits of the haddock was begun in Scotland and this comprehensive survey of the haddock fishing grounds of the North Sea plateau has been continued

throughout the present year. A report on the four years' investigations is now being prepared.

In conformity with the practice of previous years this Report aims only at outlining the chief trend of the changes in the Haddock stocks of the North Sea. The previously described methods of taking and of dealing with samples were followed, and continued to yield what are obviously reliable and consistent results. During the year there was published a paper[1]) dealing fully with the present position reached by these researches. In this paper the need was emphasised of extending the range, and of improving the nature, of the already excellent series of statistics being collected, to the end that fully reliable information may be available for the purpose of making practically useful forecasts of fishing results. It is gratifying to note that this year some definite progress in these respects was made. Not only are the commercial statistics in future to be extended to cover the area to the west of Scotland, where the Haddock stock is linked up with that of the North Sea, but during the year additional valuable biometric data referring to the south-eastern North Sea were received from German and English collaborators.

As has been stated in recent Reports this work has reached the stage where the yield of the North Sea Haddock fisheries for eighteen months or two years ahead can be anticipated with great accuracy, and definite forecasts, now made experimentally (but not published) have proved satisfactory. A further discussion of this subject of forecasting, including its relationship to Haddock migrations, will shortly be published.

Here it will be sufficient if, omitting quantitative observations, the general success of a forecast made in April 1929 (at the Scientific Meeting during the International Conference in London) be noted. At that meeting it was stated that the rather successful 1926 brood should, for most of its fourth year (i.e. 1929) serve to provide catches just above the normal. By the end of the autumn of 1929, however, the latter brood would, on the analogy of the 1923 brood, have made the major portion of its contribution to the catches. Thus as the 1927 brood had proved to be almost a failure, catches might be expected to dwindle below the normal from late autumn (1929) to well on into 1930. But about August of the latter year there should take place a marked increase in the catches owing to the upgrowth of the highly successful 1928 brood. In 1931 still greater catches should accrue from this brood during its fourth year (the last in which a successful brood, under present fishing conditions, makes a considerable contribution to the catches). After the autumn of 1931 the course of events would therefore depend on the degree of survival of the 1929 and 1930 broods. As far as fishing results are known (i.e. up to the end of 1930) the course of events has fully justified anticipations. At the time of writing a fair idea has been obtained of the relative success of the 1929 and 1930 broods, upon which the results of the fishery will largely depend after the autumn of 1931. Unfortunately both of these broods have proved to be of the poorer sort numerically — the 1929 brood being barely moderately numerous, and the

[1]) Thompson, H.: On the Possibility of effecting and utilising accurate Estimates af Haddock Fluctuations. (Rapp. et Proc. Verb., Cons. Perm. Int. pour l'Exploration de la Mer. Vol. LXVIII, Copenhagen 1930).

1930 brood almost as complete a failure as that of 1922, which was the worst on record. Under the circumstances — with the lack of any great number of upgrowing young fish — the estimate of the 1931 catch (made in 1929) requires some modification now. Although the 1928 brood will sustain catches well above normal (except during most of the early months when migration takes place to and from the spawning grounds) the summer and autumn catches will not be so great as anticipated, although unusually large numbers of medium-sized Haddock (of the 1928 brood) will be captured in the area lying between 56° N. (in the North Sea) and the Butt of Lewis, and including the Northern North Sea, Orkney and Shetland. Small Haddock will, however, be scarce generally, and Haddock fishing will be poor on the Dogger and southern Fisher Banks. After the autumn of 1931, when the major portion of the 1928 brood has been fished out, there will be a sharp drop in the catches generally, and during 1932 and at least the first half of 1933 the results will be very poor — indeed, they will continue below normal for that period, and be of the order of those experienced during 1923 and 1924, when, as a result of the failure of the 1921 and 1922 broods, complaints were general of the scarcity of Haddock. It is therefore to be hoped that a highly successful brood will be the outcome of the 1931 spawning season and will, like that of the year 1923, relieve the depression which is always caused when two successive years produce broods in only meagre numbers.

Herring.

The data concerning the occurrences of "spawny" haddocks which have been collected over a period of ten years are now being prepared for publication.

Intensive search was made for herring larvae at periodic intervals from February to December within the various sections of the whole of the continental shelf from the Dogger Bank to north of the Shetlands and southwards along the west coast of Scotland to the Clyde.

During April an extensive survey was made of spring spawning areas. Of the numerous small larvae secured 82 per cent. was obtained in the Minch and north of Scotland, 17 per cent. from the west of Scotland and one per cent. from south of Shetland to the Moray Firth. Yolk sac stages were taken in greatest abundance in the neighbourhood of Cape Wrath during the first half of the month and in small numbers during the early part of the second half of the month in the Clyde area. The occurrence of a greater proportion of the larger larvae in the catches south of the Minch suggests that hatching is earlier in the southern region than in the Minch and north of Scotland. On 24th April larvae, mostly of from 11 to 20 mm. in length, were caught in large numbers at 56° N. 7° W. at a considerable distance from the nearest known localities of spawning on the Scottish west coast. It is more probable that these larvae were derived from a locality of origin near the north-west coast of Ireland. During the visit to the Clyde area abnormal conditions prevailed. Very few small larvae were obtained in the vicinity of the Ballantrae Banks; the chief spawning centre and the slightly larger larvae were most numerous in a south-westerly direction from the banks. Surface drift bottles liberated

on the spawning grounds were subsequently recovered on the north-east coast of Ireland. Extremely few small spring larvae were captured in the north-western area of the North Sea and the insignificant numbers of larger larvae at sizes ranging from 26 to 35 mm. obtained there in the early months of the year can only be ascribed to a winter carry over of larvae hatched during the previous autumn. As is usual during the summer months herring larvae were extremely poorly represented in the hauls made in the Northern North Sea.

Positive records of larvae from 20 to 30 mm. in length were obtained in May between the Shetlands and the Norwegian Deep, on the east side of Shetland and to the north of the Viking Bank and also in June to the east of the Orkneys, within the Moray Firth and at the entrance to the Firth of Forth. The yield of larvae caught during the cruise of the "Poseidon" in July in the young fish trawl or in the meshes of the great herring trawl was not very important. As far as could be judged from their size they belonged obviously to a spring spawning herring.

In August observations made along the west coast of Scotland yielded negative results. In September herring larvae were caught in abundance along the east Scottish coast but they were comparatively scarce along the north of Scotland and absent in the Minch.

In the first half of October larvae from 13 to 26 mm. in length were captured by the Research Vessel "Dana" on the Long Forties and larvae from 7 to 20 mm. in length in the Scottish coastal waters south of Aberdeen. In the area east of the Long Forties no larvae were observed. The fact that the larvae from Long Forties were larger than those from Scottish coastal waters suggests that those from the Long Forties were not derived from herrings spawning there but from banks nearer to the Scottish coast. During this month observations were extended by the "Explorer" in an easterly and south-easterly direction from Aberdeen to the north-east corner of the Dogger Bank and along the whole extent of its northern edge and between it and the English coast. Yolk sac stages and small larvae were taken in abundance on the Aberdeen grounds while slightly larger larvae were obtained in decreasing numbers to the middle of the "Gut". Larvae, however, were absent from the hauls on the east side of the "Gut" and along the whole northern extent of the Dogger Bank, and did not reappear in the hauls until off the Northumberland coast and towards the Forth where the numbers increased considerably in the catches at the northern station.

In July and August samples of the larger transition and smaller adolescent stages were secured from the West Coast of Scotland. These represented a brood present in enormous numbers. Scale pockets were developed in all the specimens examined. Keeled scales were also developed and metamorphosis was completed at sizes from 45 to 50 mm. — a strong indication that these young forms were of spring origin. Larvae 40 to 45 mm. in length secured in Aberdeen Bay in December showed no signs of scale pockets being laid down and were still in the thin elongated condition and a long way off the scaled stage.

As in former years, samples of small scaled herring from the estuaries of the Forth and Tay were examined during the progress of the fishery prosécuted there.

The summer drift net herring fishing of the north-western North Sea was carried

on with more than average success from the beginning of June until 12th July. Thereafter catches became very poor, particularly on the Shetland and Orkney grounds. As shown in the paper "Scottish Herring Shoals: Pre-Spawning and Spawning Movements" by H. Wood (Scientific Invest. Fishery Board for Scotland, 1930, No. I), this decline in the fishery usually beginning about the end of July or early in August — although good landings consisting mainly of spent fish may be recorded for short periods late in August or early in September — is of normal occurrence. In season 1930, however, a steep fall in the catches occurred about the middle of July and the decline was particularly sharp on the Shetland and Orkney grounds where the fishery in the latter part of the season was one of the poorest on record.

It has already been noted that the beginning of the trawled herring fishery on the Fladen Ground was fully a fortnight belated and that the total quantity of herrings caught by German trawlers in 1930 was 12 mill. kg. less than that of the previous year.

From an analysis of the material collected on the experimental cruise of the Research Vessel "Poseidon" in June and July in the vicinity of the Fladen Ground the German investigators conclude that the material consisted mainly of two different groups — an autumn spawner (Bank Herring of the Western North Sea) and a spring spawner (herrings from the Hebrides) and that the latter was prevailing in numbers.

Dr. Lissner from his investigations of the commercial catches was able to demonstrate that during the year 1930 amongst the Fladen Ground herring the eight year old fish of 1922 were still prevailing and that in addition the age-group of 1924 was also of certain importance. Amongst the Dogger Bank herring, however, besides the 1924 representatives the very young group of 1926 was the prevailing one. It was for this reason mostly that he predicted, as stated in his already mentioned publication, that the average length of the herring caught during the season 1930 would be diminished and that consequently a marked decrease in the yield of the fishery was experienced.

The regular examination of samples of trawl caught herrings from the Fladen Grounds carried out at the Laboratory, Boulogne-sur-Mer, gave the following values (expressed as percentages) for the different stages of sexual development:—

Fladen Ground Trawled Herring

Period	Degree of Maturity						
	I	VIII—II	III	IV	V	VI	VII
8th May—10th June	28.6	47.7	..	..	..	..	23.8
11th—26th June	21.2	66.8	..	..	..	..	12.1
26th June—10th July	10.4	65.6	10.4	..	3.4	3.4	0.7
10th—25th July	7.0	41.9	18.6	11.6	20.8	0	0
25th July—9th August	13.1	29.5	26.2	19.7	11.4	0	0
9th—24th August	4.7	19.1	36.6	22.2	15.9	0	1.5
24th August—8th September	10.0	18.8	18.9	15.5	14.4	21.1	1.1
8th—21st September	12.7	42.5	8.5	10.6	6.3	2.1	17.0
October	14.7	26.5	14.7	20.6	8.8	5.9	8.8

M. LE GALL concludes from the above data that on the Fladen Ground, as on the trawling grounds of the Smalls and Klondyke (Inistrahull) we have to deal with two distinct populations — herrings which are feeding and herrings which are preparing for spawning. The spawning of the latter would take place in the neighbourhood of the Fladen Ground from the end of August until mid-September, the spawning of the former would be later — probably in November—December.

From the examination of the material it is apparent to him that spawning does not occur on the Fladen Ground but rather in its neighbourhood as the herrings classified in Column VI (spawning) are really at Stage V—VI, that is to say, near full maturity which, however, has not yet been reached. The spawning of these herrings, which has not been observed at this period on the Fladen Ground, must take place only on spawning grounds not far distant.

The material collected by France is still being examined with regard to age and growth.

A preliminary examination has been made of the Scottish material. Great variations took place in the composition of the shoals within relatively short intervals of time. During the most productive phase of the fishery from the beginning of June until 12th July fish with five winter rings on their scales predominated in the drift net catches north of the latitude of Peterhead although younger year-classes were also prominent. About the middle of July an important change was observed to take place in the composition of the shoals and fish with five winter rings which had previously predominated now became the most poorly represented of all the age-groups between three and eight years.

It has long since been known that a proportion of the early summer shoals, particularly on the Shetland and Orkney grounds, consists of fish which have spawned in spring. It has hitherto been impossible to state how long these spring spawners remain on the drift net grounds as with the quick recovery of the reproductive organs in the early summer months evidence of the previous spring spawning soon becomes obliterated. A considerable number of fish in the June samples and in one sample caught in July showed definite signs of recent spring spawning. These fish had three or more winter rings on their scales but fish with five winter rings predominated over all the other age-groups.

The following table gives the percentage age-composition of averaged samples caught between the latitudes of Peterhead and Shetland (1) from shoals during the most productive period of the fishery (2) from shoals in which spawners predominated and (3) from catches of spents:

Averaged Percentage Age-Composition.

Period	Winter Rings										
	2	3	4	5	6	7	8	9	10	11	12
5th June—9th July.....	15.3	25.2	18.0	25.7	5.9	6.1	3.3	0.4	0.1	..	..
Spawners:											
29th July—27th August..	5.2	22.7	20.0	7.1	20.0	17.2	3.9	2.0	1.7	0.2	..
Spents:											
August—September	2.0	18.6	24.3	8.9	18.6	17.1	5.5	3.0	1.5	0.3	0.2

From the above table it will be seen that fish with three and four winter rings were present in relatively large numbers throughout the whole of the fishery, fish with five winter rings were important in June and July, while two other groups with six and seven rings respectively came into prominence at the spawning season.

The results of the investigations so far completed in 1930 may be summarised as follows:—

A very successful fishery was experienced, especially on the more northerly grounds, from the beginning of June until 12th July.

Amongst the dense population of herring, fish with five winter rings on the scales predominated.

Spring spawners were identified in the shoals in June and even in July and the majority of these likewise had five winter rings on their scales.

After 12th July the fishery declined rapidly and fish with five winter rings (the age class which showed the highest proportion of identified spring spawners) formed a very small proportion of the catches.

The spawning or spent shoals consisted largely of fish with 3, 4, 6 and 7 winter rings.

It is known that a decline in the fishery may occur just prior to or during the spawning season due to modifications in the vertical movements of fish approaching full maturity. In 1930, however, it is clear that the decline before the commencement of autumn spawning was accentuated by the withdrawal of spring spawners amongst which fish with five winter rings predominated.

From the results of the fishery it would appear that in the early summer shoals spring spawners and immature fish were predominant and when spring spawners withdrew from the fishing grounds the shoals of autumn spawners were insufficient to maintain the fishery at its normal level.

Regular sampling of the herrings of the Firth of Clyde throughout the year has shown that the shoals have remained practically homogeneous, consisting almost exclusively of fish of the 1928 year-class.

The German racial investigations on herring, which have been in the hands of Dr. Schnakenbeck since 1923, have been steadily advanced and came to a conclusion in the form of an elaborate publication on the results arrived at. This important and well produced work is appearing in the Zeitschrift für Wissenschaftl. Biologie (W. Schnakenbeck "Zum Rassenproblem bei den Fischen". Abt. A (Morph. u. Oekol.) Bd. 21. 1931). A résumé is published in the Journal du Conseil, VI, 1, 1931. Not less than 125 samples comprising 11,074 specimens have been analysed by the author. The investigations are concerned partly with general questions of the race problem, especially for instance the constancy of characters, and deal with the special methods of analysing the racial characters. It is mainly the North Sea proper and the adjacent areas which have been taken into consideration, whilst other regions have been studied only for comparison.

M. le Gall has made racial investigations of trawl caught herring from the Fladen Ground with the following results:—

Percentage Frequencies of Vertebrae.

Year	53	54	55	56	57	58	59
1930	0.2	0.4	4.2	29.8	57.0	8.6	0
1929	..	..	3.1	32.4	51.0	12.8	0.7

The mean number of vertebrae in 1930 was 56.68 as against 56.75 obtained in 1929.

Other Species.

While the investigations were centred on the herring and haddock, routine observations have been made on all species caught on the experimental cruises of the Research Vessels. Special mention may, however, be made of the systematic marking experiments on plaice, lemon soles and skate.

Lemon sole marking experiments have been carried out from 1920 to 1929 (inclusive) but the percentage of recaptures is very low (12 per cent.). A paper is in the Press dealing with the migrations of this species in the north-western area and on the north of Scotland.

Otolith age-determinations on the changing composition of the stock of small plaice in the Scottish coastal zone were continued, while marking and transplantation experiments were also made to ascertain the intensity of fishing. During the year routine investigations on the food and feeding habits of the small plaice on the principal nursery grounds were initiated. The results of these preliminary intensive investigations, which it is proposed to continue, demonstrate quite clearly the value of this work in a study of the growth rates of populations in different areas and in the same area in different years. In each area the principal food constituents are limited to a comparatively small number of species at any particular time but the relative importance of the food species varies in different size groups of plaice. There is also considerable elasticity in the feeding habits of the plaice as is shown in the different composition of the principal food constituents on different grounds.

During June and July a cruise was made by the Swedish Research Vessel "Skagerak" to the Northern North Sea in order to study the distribution of the eggs and larvae of the witch. By means of hatching fertilised eggs and from eggs caught in plankton nets a valuable material was procured for studying more closely the characteristics of the witch eggs and the distribution of these eggs when spawned.

Hydrographical and Plankton Investigations.

The scope of these investigations may be ascertained from the itineraries of the different cruises. In the matter of hydrography Scotland has during the past year worked on the same lines as formerly. That is to say, while no cruise, exclusively hydrographic, was undertaken, the collection of temperature and salinity data at specified depths from

surface to bottom formed an essential feature of the work carried out on all expeditions. Special attention was again given to series of hydrographic stations in linear arrangement. On the Moray Firth to Stavanger line and on the hydrographic section parallel to and in the near proximity of the eastern shores of Orkney and Shetland observations were repeated in two or more seasons of the year.

The salinity determinations were made in all cases by the Government Chemist and the hydrographical data later transmitted in the prescribed form for publication in "Bulletin Hydrographique".

Throughout 1930, at least a part of the north-western area of the North Sea was visited in each of the months from February to November inclusive. In the early part of the year practically the entire area was flooded with high salinity water of normal temperature. By the month of July there was distinct evidence that a superficial layer containing much water of low salinity had encroached westwards over the Northern North Sea to longitude 1° West. Water of recent Atlantic origin was then found only in the immediate vicinity of the Shetland Islands. The complete data for the latter part of the year are not yet available.

During July the amounts of dissolved oxygen at various depths and over a wide area of the North-Western North Sea were determined with a view to furthering our knowledge of the relationship between the cold bottom layer, characteristic of the deep basin of the Northern North Sea in summer months, and the surrounding medium. Generally speaking surface waters were found to be supersaturated while the cold bottom waters showed marked sub-saturation.

Attention has again been focussed on the subject of surface drift currents by the publication during the year of two papers by John B. Tait (Scientific Investigations, Fishery Board for Scotland, 1930, Nos. II and IV) containing his interpretation of the results accruing from previous drift bottle experiments. This work has been carried on by Scotland almost continuously since the year 1920 and last year 1260 surface floaters were liberated at selected positions. Already over 200 of these have been returned from British and Continental shores.

Plankton collections, with standard nets, were taken on all cruises of the Research Vessels, special attention being directed to the capture of the early stages of the herring and haddock. In Scotland the intensive study of the seasonal distribution of the various developmental stages of *Calanus finmarchicus* with a view to elucidating the life-cycle of the species within the area has been continued. The sorting of the abundant plankton material obtained on the cruises is still in progress. In the early months of the year in the northern part of the area a few "Atlantic" forms occurred as far south as the Moray Firth. In February and March, however, the plankton was characterised by the presence in abundance (especially round the north of the Shetlands) of *Biddulphia sinensis*. It will be recalled that the species was also abundant in this area in 1929 from March to the middle of May.

In April, May and June the plankton collections presented no features of special interest but from July onwards there is ample evidence of a strong penetration of the area by forms of Atlantic origin. *Chaetoceros Erbenii*, *Agalmopsis*, etc. noted in the

Clyde region in August were subsequently observed in November east of the Shetlands and southwards to the latitude of the Moray Firth. *Salps* and *Doliolids* were recorded off the west and north-west coasts in August but were never taken in abundance. Disintegrated specimens occurred frequently in the catches at the Shetlands and in the Moray Firth during November. *Physophora hydrostatica* was common in February within the deeper northern North Sea but was noted during the greater part of the year.

The occurrences of young fish other than herring were more or less normal except that larval wrasses of the species *Ctenolabrus rupestris* occurred with unusual frequency off the East Coast of Scotland during September. Hake larvae were caught from the beginning of August to the beginning of November. Their captures were all made in close proximity to land along the whole extent of the west and north coasts during August, while the captures within the North Sea were confined to the Moray Firth and East Coast of Scotland as far south as the Aberdeenshire coast.

SOUTHERN NORTH SEA
1930.

By

W. Mielck.

A. Preliminary.

In the year under report, the scheme and aims of the Committee have in the main remained the same as in previous years. The biological fishery researches, directed in the first instance to the study of the biological and fishing conditions of herring and of plaice, as also of haddock and of cod, have led to scientific and practical progress in the current year too. Not only so, but in the investigations regarding other kind of fish and serviceable marine animals, and in that of the plankton and benthic life, conducted in part in intimate connection with the study of the fish and partly independently, important results are to be recorded, as may be adequately gathered from the several sections of the following report. Nevertheless, several results and some progress of more general significance deserve special mention.

From the practical point of view, the results arrived at, particularly as to the haddock in the Northern North Sea, are of great value. And it is upon these that the proposal of the Consultative Committee is founded to organize a predictive service — under the leadership of the Fishery Board for Scotland — on the basis of a study of the data on young fish to be collected every year by the nations concerned, in order to inform fishermen of the bulk of the coming marketable stock and thus of the prospects for the catch of the ensuing year. Although the moment for the organization of such service has not arrived yet as far as the southern area is concerned and as regards the fish

chiefly coming into question there, such as herring, plaice and sole, it was already possible to issue certain predictions regarding herring fishing, which as in the past year have met with confirmation this year too in England, and now in France and Germany also. With respect to plaice, there is some justification for the hope that this aim will be achieved in the near future. Further, there is some prospect of being able to foretell results in some regions with regard to cod. The English investigations respecting this fish, which have now been concluded, afford the gratifying inference that there are no signs of any danger from overfishing as far as cod is concerned, so that, contrary to haddock, any protective measures for young fish appear to be unnecessary.

The attempts made, at first in the northern area, for the saving of young haddock not yet marketable has been supported in our area by several investigations on fishing gears, in part by trials made on research vessels and by measurements carried out on board fishing steamers, partly by the ascertainment of the size of the meshes most generally employed by the fisheries of the various countries. Any detailed discussion here of this matter is rendered superfluous in view of the existence of a special sub-committee appointed for the purpose of investigating practical questions by the Consultative Committee.

In this year too, abnormal physical conditions demand special mention. In the previous year it was the exceptionally severe cold winter of 1928—29 that exercised a prejudicial influence, particularly in the eastern region, upon the conditions of life and distribution, probably too upon the spawning process, in the case of various species of fish and other organisms. In the winter of 1929—30, British research, thanks to the systematic observations on the currents at the entrance of the Channel, succeeded in verifying a second abnormal factor that may possibly prove of no less importance. This consists in the inordinately strong influx of the water from the Channel into the North Sea, which during the period extending from November to January, that is, when spawning amongst plaice had reached its highest point in the Southern Bight, was about $2^1/_2$ times more powerful than in the corresponding seasons of the previous years of observation (since 1926—27). This circumstance may serve to explain the abnormally high salinity to the west and south of Heligoland during the whole spring, 1930, as well as biological features such as, for instance, the state of things established by the French observations mentioned in our previous report to the effect that in the winter of 1929—30 but very few herring were able to make their way into the Channel from the southern portion of the North Sea, and above all, the fact that the appearance of plaice brood (reported on in B. IV. 5) set in abnormally early and in large quantities off Heligoland and in the innermost angle of the German Bight. It is hence highly probable that the shallows (Watten) of the south eastern portion of the North Sea which form the most important developing grounds of the first bottom stages, were supplied with greater masses of brood than usual by reason of the increase in the flow of water from the Channel. The further observations of the plaice year 1930 have so far confirmed this view. Perhaps, however, the general displacement of the pelagic brood towards the east — and, as we may suppose, along the course of the Channel flow also towards the north east — may have led to prejudicial results in other districts. Much elucidation on the point may be expected

from further supervision of the stock. So far nothing has been made known respecting any special effects of the increased inflow upon the herring brood. But in this connection it must be borne in mind that at present the observations on the brood of fish take place but occasionally and that our knowledge of what must be regarded as its normal conditions of life and degree of distribution is exceedingly scanty. These are gaps the urgently desirable filling up of which is in all probability only possible by means of systematic collaboration on the part of the countries concerned.

A general wish to mould the co-operative work on all sides into a more methodical and uniform shape, which should lead to results of great practical value, was particularly stressed at the proceedings of the experts of the several countries held at Lowestoft (3rd to 7th of November, 1930), when the methods to be adopted and the further collaboration in herring research, as also a plan for the transplantation of plaice on a large scale to the Dogger Bank with the object of increasing the yield of the fishery, were deliberated upon. The outcome of these discussions will be reported upon on another page of this volume.

Work at Sea.

The research steamer "Dana" has been used for investigations in the Southern North Sea in the months September and October. The area from the Danish coast across the Horns Reef area and the Jutland Bank and Little Fisher Bank out to the Dogger Bank and the Great Fisher Bank was especially investigated, but also the area between the Dogger Bank and the English and Scottish coasts were included in the investigations. The most important objects of the cruises were the localisation of the spawning places of the Bank herring and investigations as to the frequency of the various age groups of plaice in the Horns Reef area. In connection with this work hydrographical observations and bottom dredging were carried out. — Fishing experiments have been made from the "Japetus Steenstrup" with the fine meshed trawl (Eel-tog) in the western part of the Limfjord in the months of May and August in order to estimate the abundance of the different age groups of the plaice.

The "George Bligh" was in continuous commission in the area from the latter part of April to the middle of December, except during August. Eleven voyages in all were carried out, as follows:— two for experimental work on trawls, two for plaice work; three for investigations on young herring in coastal waters; two for plankton work in connection with herring investigations; two for hydrography. Co-operation with a fishery patrol vessel was secured on one of the hydrographical voyages. — A member of the scientific staff carried out a series of observations on herring drifters throughout the East Anglian autumn fishing with the object of acquiring first hand knowledge of the conditions influencing the fishery.

The English fish measurers, thanks to the courtesy of the owners and skippers of fishing vessels, have continued their work at sea.

The work undertaken by France in the southern North Sea and English Channel was carried out by the staff of the "Station de Boulogne sur Mer" on board Fishery

Patrol Vessels of the navy, and on different voyages of fishing-vessels, trawlers and drifters, and regularly on board of the Sandettie Lightvessel.

The "Poseidon" was available during the months of June and July for 2 North Sea cruises, of which the first (1st to 23rd of June) was undertaken by the Heligoland Institute into the southern North Sea and the second (24th June to 15th July) into the north western North Sea by the Hamburg Institute, the hydrographical observations being carried out in both cases by members of the Deutsche Seewarte, Hamburg. Apart from a few hydrographical investigations, the main work on the second cruise was carried on in the area of the northern North Sea, particulars of which will be found in the report on that area. The first cruise took place in the southern area, between 5° E. and the coast, from the mouth of the Ems as far as the Skagerak. This district was subjected to research at about 60 stations in sections, in the same manner as in May, 1929, in regard to bottom fish and brood, bottom fauna and plankton. The investigation of the "Valuation Area" off Borkum and Norderney executed on this cruise was repeated in September by the naval tender "Frauenlob", though rather incompletely on account of unfavourable weather. The ordinary inspection of the composition of the fish stock in the Heligoland Bight, and the investigations on the brood of the herring in winter and spring were carried out by the "Augusta", whilst the observations on the young flatfish close inshore were conducted by small motor-boats.

Observations were carried out on board the Dutch research steamer "Nautilus" during the months of May, June, and October in the northern North Sea, these being directed to experimental trials with the saving trawl. From January to April the investigations by means of the Johansen trawl were continued with regard to the quantity of young plaice, these being carried out in the mouth of the Haringvliet and near Helder, whilst in the Haringvliet fishing for larval herring took place at the same time.

Two cruises were made by the Scottish Research Vessel "Explorer" into the Southern North Sea across the line Berwick—Lindesnæs, the first in June, the second in October. These cruises, which extended southwards to the north edge of the Dogger Bank and eastwards to 4° East Longitude, were undertaken to link up with contemporaneous observations carried out further north. On both cruises trawling experiments were made with the standard commercial otter trawl with a fine mesh covering over the cod-end. In addition to the routine observations made on all trawl catches, serial hydrographic data and plankton collections were obtained from selected positions on both cruises.

B. Fish.

I. General.

1) Statistics and Ichthyometrics. The collection has proceeded in England without change of method. The numbers of the chief species measured are approximately as follows:—

At Sea.

Plaice	Cod	Haddock	Turbot	Brill	Soles	Total
460,277	23,792	223,385	2,930	1,358	14,517	726,277 [1])

[1]) including 18 Hake.

On the Markets.

Plaice	Cod	Haddock	Herring	Total
52,159	3,606	11,931	69,638	137,334

All measurements of haddock made at sea have been placed at the disposal of the Fishery Board for Scotland.

The measurements taken by the Station de Boulogne sur Mer at the market or on the cruises at the place of capture referred in the main to the following fish: Herring, Mackerel, Cod, Haddock, Whiting, and Gurnard. No statistical statements were made.

The measurements taken on the research cruises at sea by the Heligoland biologists, as also the investigations with regard to young fish inshore amounted to the following quantitative figures:

	Plaice	Other Fish	Total
offshore	54,600	29,600	84,200
inshore.....	9,800	4,000	13,800
Total...	64,400	33,600	98,000

The market measurements taken at Wesermünde, the beginning of which was mentioned in last year's report, aim in the first place at establishing the lengths of the several market categories of important fish species as well as at ascertaining any alterations they may have undergone. In addition, age determinations have been made. The following figures were taken of measurements from fish landed from the North Sea (Skagerak included[1]):

Plaice	Cod	Haddock	Other Fish	Total
6,984	1,417	5,023	3,034	16,458

Further, investigations were instituted on the basis of the logs of the skippers with regard to the fishing grounds of the trawlers, and calculations were made as to the catching time (catch per day and hour) on the cruises in the respective districts, in order to arrive at a more exact statistical standard for the intensity of fishing than is offered by the days of absence from port, as also to render comparison possible between the data regarding the catches by commercial trawlers, on the one hand with one another, and on the other with the results of research steamers.

2) Littoral Fishing. Investigations at the laboratory in Ostend concerning the fishery of the Belgian coastal fishers have been continued as previously, special attention being given to the young pleuronectids and to the whiting.

In the Limfjord, as on the English and French coasts, investigations have been made regarding sprat (see B. V); off the English, French, and German coasts, as regards young herring; off Sheringham (Norfolk) on crabs and off the French coast with respect to fishing for *Pecten maximus* (see B. VI).

The close investigations carried out in the last few years off the German coasts

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[1]) The remaining work done at the Wesermünde market refers to the Barents Sea and to Iceland, and is indicated in the reports on the North-Eastern and North-Western Areas.

as a contribution to the elucidation of the problem of fluctuation with regard to flatfish in the first two years of their life had to be restricted, in the first place in order to render possible the working up of the material already gathered. The stock at the mouth of the Elbe could be controlled by observation in August only, though this was carried out on the Heligoland "Düne" (sand island) every month from January to July and in September. The ample material collected affords valuable clues regarding the biology of the various flatfish species. Considerable annual fluctuations were verified in the quantitative relations; on the other hand, seasonal fluctuations also occurred in the distribution. Further, it became obvious that such alteration in the dispersion is difficult to supervise by reason of the manifold character of the coasts and of the varying conditions in the bottom and tides of the shallows (Watten) and estuaries. If, therefore, it is intended to obtain adequate certainty for practical purposes, such as for example the forecasts of the relative frequency of the year-classes, supervision of the stocks would have to be effected every year at repeated intervals and over wide areas. But the funds at disposal are not sufficient to allow of such a regular and continuous control. Besides, the necessary supplementary data from the coasts of the neighbouring countries are wanting, in order to be able to make practical use of such control. In all probability, therefore, German investigations will in future be restricted to a control exercised beyond the shallows (Watten) and the estuaries. In the open sea itself the conditions of life, and consequently distribution of fish, are more uniform. There the determination of the frequency can be more easily established, and to an adequate degree from the II-group upwards by the employment of the covered cod end now used in the German observations, the catches of which will in many cases probably afford also a conclusion as to the frequency of the 0- and I-groups. — The investigations carried out by order of the Prussian Government, mentioned in the previous report, regarding the frequency of young flatfish in the catches of the shrimp fishery in the shoals, were regularly continued up to October. Very copious material is at disposal regarding these young fish, which, together with the remainder of the catch, are used for the production of fish-meal, this information being collected from all the important places on the coast during a whole year; a report on this is being worked out.

3) Eggs and Larvae. On the occasions of the cruises undertaken by the station at Boulogne further observations were made, catches being regularly executed on board the Sandettie lightship. The material has not yet been elaborated.

On the voyages of the "Poseidon" and of the "Augusta" the distribution and quantities of the pelagic brood was, as usual, made a subject of inquiry. In addition, the spawning conditions of the coastal herring in the shallows near the island of Sylt were subjected to investigation. Some of the results obtained are mentioned in the sections on the herring and the plaice. Two publications have appeared on the mode of life and spawning of the topknot, *Zeugopterus punctatus*[1]).

[1]) Cl. Künne. Aquarienbeobachtungen am Zwergbutt, *Zeugopterus punctatus*. — Intern. Revue d. ges. Hydrobiol. etc. Bd. 24, H. 1—2, 1930.

Cl. Künne. Über Laichen und Entwicklung von *Zeugopterus punctatus* im Aquarium der Biologischen Anstalt auf Helgoland. — Ber. d. D. W. K., N. F. Bd. V, H. 3, 1930.

4) Food of Fishes. The collection of herring stomachs was continued by the English collaborators (see Sect. I), and observations on stomach contents of various species by the French.

But few specimens were collected on Germany's part for the completion of the material that is in hand, whilst reports are in preparation on the nourishment conditions of flatfish, notably of plaice, in the "Valuation Area", as also on the food of the Gadidae. Research was continued regarding the chemical composition of invertebrate bottom animals, with the object of determining their value as food for fishes.

By Scotland large numbers of stomach samples of the haddock were collected in the north western part of the southern area from each observation station of the "Explorer".

5) Marking Experiments were carried out by the English colleagues on plaice in the Schiermonikoog and Haaks areas (see IV. 7) and on crabs near Sheringham (see VI).

6) Experiments with Saving Gears. By the Lowestoft laboratory preliminary experiments have been carried out with an apparatus for throttling the small meshed cover of a covered cod-end. These give strong indications that the majority of fish that escape through the meshes of the cod-end do so while the net is being towed, not, as has often been suggested, only during the hauling of the net after towing has ceased. It is hoped that further experiments will give definite proof on this point. The data on the size of fish of different species passing through cod end meshes of various sizes are now being prepared for publication.

A report was published on the result of the German experiments with the Swedish saving gear[1]). In connection with the question of the effect of nets of wider meshes when fishing for round fish, the small haddocks rejected as unmarketable were measured on board a commercial trawler.

Dutch saving-trawl experiments took place in May, June and October on board the "Nautilus" in the northern North Sea.

In accordance with the resolution passed by the Committee (see Rapp. et Proc.-Verb. LXVI, p. 48, No. 6), inquiries were instituted in some countries concerning the size of mesh most generally employed in the trawl.

II. Cod and Haddock.

During the North Sea cruise of the "Dana" cod, haddock and whiting caught in the otter-trawl and the Herring trawl were subjected to age determinations.

The English work on the cod which has been referred to in these reports for previous years has now yielded definite conclusions. A paper on the subject is in preparation for publication in the "Fishery Investigations" series. Briefly, the main results are:— (1) It appears that although there are areas in the North Sea where the growth is not the same, nevertheless the majority of small cod occur in the area of fastest growth, where the mean modal length at successive anniversaries is approximately as follows:—

[1]) A. Bückmann. Bericht über Versuche mit dem schwedischen Schontrawl auf den Jungschollengründen in der Deutschen Bucht. — Journ. du Conseil, VI, 1, 1931.

Years of age.....	1	2	3	4	5	6
Length in cms.....	18	36	56	68	78	?90

(2) A rough estimate has been made of the relative strengths of broods, from 1905—1911 and 1919—1928. There is no correlation between strength of brood and number of spawners, from which it may be deduced that the (very intensive) trawling for spawning cod has not reduced the annual output of eggs sufficiently for this to be a limiting factor in cod abundance. In other words the stock, as fished at present, is safe. (3) The fishery of immature cod does not result in the proportion of small to large fish caught being unduly high (as compared, for example, with the haddock), and there is no reason to believe that anything would be gained by reducing the number of immature fish taken. The fluctuations in brood strength are considerably damped by the time the fish becomes mature and valuable, the damping being evidently due to the crop of large fish being the product of several broods. (4) Disregarding fluctuations and the accumulated stock of the war years, the catch of cod per unit of fishing power in the North Sea has not appreciably fallen, comparing post-war with the pre-war period. (5) It will be possible roughly to forecast the yield of the large cod fishery from statistics of "Small" cod at Grimsby, collected 2—3 years earlier. Naturally a number of other matters are discussed in connection with these main conclusions.

Numerous cod, haddock, and whiting were measured on the occasion of the French and German investigation cruises. On the cruise of the "Poseidon" in June unusually large numbers of small haddock were netted, particularly between the Oyster Grounds and the line Norderney—Heligoland, the biggest catch being 836 per hour near the Norderney lightship. To the north of Hornsriff and off the Skagerak the quantities were surprisingly slight. The measurements made on that cruise of all the haddock, as also the age-determinations of about 2,300 specimens, were transmitted to the laboratory of the Fishery Board for Scotland to be worked out and used for the forecast service. — In the south eastern North Sea the whiting was far more numerous than in May 1929 after the cold winter.

The Scottish excursions into the southern area by the "Explorer" were designed mainly to extend the more intensive haddock observations made further north and to maintain the continuity of observations from previous years. All haddocks caught by trawl were measured and copious scale samples were obtained for age-determination. Large numbers of stomach samples were collected from each observation station for analysis of the food contents. — The haddock scale material collected by the Research Vessel "Poseidon" in June from about 60 stations in the eastern part of the area from about 53°30′ North to 57°10′ North and from the German and Danish coasts and at the entrance to the Skagerak in a line north of Hanstholm has been worked up at the Laboratory, Aberdeen. — The scale data are being used as an aid to the analysis of the ichthyometrical haddock data collected by the Ministry of Fisheries (England).

Last year reference was made to the 1928 year class, the success of which was comparable to that of 1923. In contrast to the earlier brood the 1928 progeny was distributed in greatest numbers mainly in the northern and western sections of the North Sea, being much more poorly represented in the south-easterly and shallow areas. In

spite of the fact that the 1928 year class has since been subjected to a year's attrition by the fishery it outnumbered the 1929 year class by between three and four to one, the numerical superiority being more marked in the northern than in the southern area. In the latter area only two per cent. of the catches belonged to older year classes. In October the 0-group or 1930 year class was very poorly represented in the catches of the small meshed net probably partly because the observations were made before all the progeny had taken to a bottom habitat.

A paper has been published on the fluctuations of the Haddock stock[1]).

III. Herring.

1) Fishing experiments. Statistics and Analyses of herring catches (Composition in terms of length, age class, sex, maturity). Fishing experiments with the German three boards herring trawl were carried out by the "Dana" in September—October in different localities, mainly on or near the Tail End of the Dogger Bank.

In England the examination of the commercial shoals during 1930 has been largely restricted to the East Anglian area, 44 samples have been examined for age, length and maturity, and of these 42 represent the spring and autumn fishing off the Lowestoft-Yarmouth coast. The sampling this year has been improved, the aim being to acquire data which are more representative of the stock than those previously collected. Two fish-measurers were employed during the season, one at Yarmouth and one at Lowestoft, and many thousands of herrings were measured each week. Concurrently with these operations, commercial samples were examined at the laboratory, and the age-composition of each c.m. length was determined for each week of the fishing. This age-composition was then applied to the c.m. groups of the market measurements and a more correct age of the stock was thus assessed. From such work, it is hoped to arrive at the quantitative relation which the old stock bears to the young stock, and also at a more accurate estimation of the rate of mortality or disappearance.

A forecast of the fishing in the "Fishing News" again proved to be satisfactory. The main year-classes were again 1924, 1922 and 1921, the last two appearing in only small proportions. There are also signs of a new rich year-class — 1927 — appearing in the shoals. This should be more apparent in 1931. A report has been published[2]).

The work carried out by the station at Boulogne was chiefly engaged upon the herring in the south western section of the North Sea and in the eastern portion of the Channel (Sandettie—Dyck and Calais—Antifer). On the 1st of January, 1931, the results allowed the herring population in these areas during the fishery season of 1930—31 to be characterised as follows:—

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[1]) Harold Thompson. On the Possibility of effecting and utilising accurate Estimates of Haddock Fluctuations. — Rapp. & Proc. Verb. LXVIII. 1930.

[2]) W. C. Hodgson. Investigations into the Age, Length and Maturity of the Herring of the Southern North Sea. Pt. III. — Min. Agric. & Fish. Ser. II, vol. XI, No. 7, 1929.

Age (years)	3	4	5	6	7	8	9	more
Year of birth	1927	1926	1925	1924	1923	1922	1921	1920 and earlier
%	12.7	21.6	15.6	23.7	10.2	8.9	5.7	1.3
*)	+	—	—	+	—	+	+	

*) Year classes well represented +.
» » badly » —.

The above figures show the influence exerted by the favourable years of 1921, 1922, and 1924 and that of the unfavourable years 1923 and 1925 (to which latter 1926 must be added) upon the composition of the herring population, thus confirming the previous observations, as also the forecasts[1]).

In the Laboratory for Fishery Investigations at Hamburg, the statistics of the German herring fishing have been further elaborated as heretofore, special attention being again devoted to the trawl catches of herring, on which detailed reports have been published[2]). So, too, the study of the German drift-net fishing has been continued as in former years on the basis of a large number of log books placed at the laboratory's disposal by the Captains of the drifters. The charts for the year 1929 have been published[3]).

The herring stocks, which form the basis of the German fishery in the western North Sea, were analysed again, the samples used being mainly derived from the market at Altona. The varying composition according to the year-class could be determined. The similar yet differing conditions ruling in the stock on the Fladen ground and on the Dogger Bank were clearly displayed in a publication[4]). It could be demonstrated that during the summer of 1930 the 8-year old fish of 1922 still predominated among the Fladen ground herring, the age group of 1924 being also of a certain importance. On the other hand, among the Dogger Bank herring, in addition to the 1924 age group the young one of 1926 predominated, which circumstance, as predicted in the above-cited publication, explains why the average length of the herring caught during the season of 1930 was found to have diminished. The consequence was a considerable reduction in the weight obtained, the yield of the German trawl herring fishing for 1930 amounting to only 56.2 million kgs., that is, 12 million kgs. less than in the previous year. — With regard to the cruise of the "Poseidon" (24. VI—15. VII) for experimental catches and analyses of herring taken in the northern North Sea, detailed particulars will be found in the report on that Area.

Log books had been prepared by the Dutch Institute for Fishery Investigation

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[1]) Jean Le Gall. Remarques et Statistiques biologiques sur les Harengs de la Mer du Nord et l'entrée Orientale de la Manche en 1928. — Idem: 1929. — Rev. des Trav. de l'Off. des Pêches.
Jean Le Gall. Quelques prévisions sur la prochaine saison de pêche du hareng en Manche Orientale. — Pêche Maritime. 9—16—23 Novembre 1930.

[2]) H. Lissner. Die Deutsche Trawlheringssaison 1929. — Der Fischerbote 1930, p. 57.
H. Lissner. Die deutsche Trawlheringssaison 1929. — Jahresbericht über die Deutsche Fischerei 1929, p. 204.

[3]) H. Lissner. Monatskarten zur Deutschen Treibnetzfischerei 1929. — Ber. d. D. W. K., N. F. V, 3, p. 79.

[4]) H. Lissner. Die Voraussage des Heringsfangs. — Der Fischerbote, 1930, p. 180.

for distribution amongst herring fishers after the model of the books made use of in Hamburg for the monthly charts of the drift net fishery for the collection of dates. These could, however, only be distributed by the beginning of November, so that but few data may be expected for 1930. During the autumn, about 1700 herring from catches by Dutch vessels in the south western North Sea (Smith Knoll and Sandettie) were examined as to their age, the results being as follows (countings of the summer rings on the scales):—

Age (years)	3	4	5	6	7	8	9	10 +	?
Year of birth	1927	1926	1925	1924	1923	1922	1921	1920—	
%	11.3	23.3	12.4	18.5	8.1	12.6	9.8	2.1	1.9

The first samples (in October) comprised many 3- and 4-year old fish. If the November-December herring only are compared the percentage composition is as follows:—

Age (years)	3	4	5	6	7	8	9	10 +	?
Year of birth	1927	1926	1925	1924	1923	1922	1921	1920—	
%	11.5	15.5	10.9	20.1	9.6	15.3	12.0	2.6	2.5

As was to be expected from previous investigations, there is thus shown that the favourable year classes 1924, 1922, and 1921 predominate, whilst the year classes 1925 and 1923 are relatively poorly represented.

Adult herrings with developing reproductive organs (but none further advanced than Stage III) were caught by the Scottish investigators by trawl at 55°17′ N. 0°31′W. on 11th October.

2) Young Herring. The "Dana" observed rather large quantities of young herring mixed with sprat to the north of the Tail End of the Dogger Bank. — The English work on the 0-group herrings during 1930 confirms the results obtained in previous years. — The observations on the 0-group, regularly continued on the French coast, confirm the view that these young fish abandon the coast at the end of January and beginning of February, when they have attained a length of 13—16 cm.

3) Location of spawning places and larval Herring. Observations on the quantity and distribution of the larvae were made from the "Dana" in September—October. The experiments were carried out partly with the 2 meters stramin ring trawl and partly with the Hensen Net (opening $^1/_3$ m^2). No herring larvae were recorded either in the ring trawl or in the Hensen Net in the area between the Danish coast and 4° E. long. On the southern edge of the Dogger Bank and the Outer Silver Pit rather large quantities (up to about 750 per $^1/_2$ hour in the ring trawl) were found, more than half of them being below 10 mm. in length. Along the coasts of Northumberland and South Scotland the quantity of larvae was rather small, and almost all the specimens were more than 10 mm. long. The results of the vertical hauls with the Hensen Net were in good accordance with those of the ring trawl experiments. A publication of the result is in preparation.

In England the collection of statistics of the distribution of "spawny" haddock was continued.

French research was directed, in the same manner as in the previous years, to the investigation of the spawning places in the southern North Sea, in the Dyck and Sandettie regions, and also in the eastern Channel from la Bassure de Baas as far as Antifer, during the spawning period of 1930.

The following research work was carried out by the Heligoland collaborators:— (1) Observations concerning the presence of larvae off Heligoland and in the region of the estuaries of the Jade—Weser and of the Elbe were continued (December to May). In this year, too, the brood, which was first met with in December, consisted of scanty numbers of large larvae of about 31 mm. in length. (2) In April the spawn of the coastal herring on the *Zostera* Banks in the shallows near List on the island of Sylt was studied, observations being made on the development of the eggs and larvae. The first eggs were found on the 9th of April. (3) In June the "Poseidon" fished at about 60 stations throughout the whole section between Borkum Riff and the Skagerak, east of 5° E., with a young-fish trawl and occasionally with a small herring trawl for this year's herring brood. Whereas in May, 1929, the larvae in the south eastern North Sea from the coast almost up to the 40 m. line still occurred in the open sea generally, and in especial between Heligoland and Hornsriff, in large numbers, these areas had been abandoned in June, 1930, by the larvae and later young stages. Only the mouths of the rivers and the shallows exhibited large numbers in the last larval stages and young silver herring at all the stations visited (mouths of the Ems and Elbe, Sylt). So too, in the area off the Jutland coast, between Hornsriff and Hanstholm seawards as far as about 5° E., all the catches by day or by night gave no results apart from a few young silver herring 3 miles off Nymindegab. The numerous catches have, consequently, thrown no light upon the problem of the emigration of these young forms from out of the coastal zone into the open sea.

Investigations were carried out by Holland in the Haringvliet regarding the presence of the larvae; the material has, however, not yet been worked up.

Search was made for herring larvae in the plankton collections taken in the area from the "Explorer". The few clupeoid larvae captured on the June cruise were identified as sprats. In October herring larvae varying in size from 15 to 26 mm. were found only in the western section off the Northumberland coast. Larvae of similar sizes were also caught off the Scottish coast as far east as 1° East Longitude but in the south no larvae were found along the north edge of the Dogger Bank or in the eastern section.

4) Rate of Growth. —

5) Herring races. The study of the average number of vertebrae of the herring in the eastern Channel and the southern North Sea (Dyck—Sandettie) enabled French research to confirm to a still further degree the constancy of the vertebral mean for the region south of the estuary of the Somme (Le Gall's group II: Channel type). This mean was *56,761* for 1930, a figure approximating very closely to that for 1929 (*56,766*) and for 1928 (*56,79*). In the region to the north of the mouth of the Somme the mean amounted to *56,67*, and a figure showing a greater increase than usual, *56,65*, was also found between Dyck and Sandettie (instead of 56,49 in 1929 and 56,61 in 1928). Hence the assumption is justified that during the catching season of 1930—1931 the predominating type in the population of the eastern Channel and in the southern portion of the

North Sea was that of the Channel herring, and that the hydrological conditions impeded the penetration of larger quantities of herring of the "Southern North Sea" type into the eastern portion of the Channel, whilst favouring on the other hand the intrusion into the southern North Sea of herring of the "Channel" type. These circumstances tend to confirm the assumption put forward last year by Le Gall with regard to the hydrological conditions in their effect upon the composition of the herring population in the southern North Sea and in the eastern entry to the Channel[1]).

With respect to the racial investigations, continuously carried on by the Hamburg laboratory since 1923, an extensive treatise has been published[2]), whilst an extract will be appearing in the "Journal du Conseil". These investigations concern partly general questions, especially the question of the constancy of characters. On the other hand, the special methods of analysing the racial characters are dealt with. It is mainly the North Sea proper with the adjacent parts of the sea that have been taken into consideration, whilst other regions have been regarded only for comparison.

6) Food investigations. The stomachs of over 5000 herring were collected by the Lowestoft laboratory from the Shields area between the months of May and September. A report on "The Relation between the Feeding of the Herring off the English East Coast and the Plankton of the Surrounding Waters" has been completed, and will shortly be published. This report deals with the results of the analysis of 13,923 herring stomach contents and 778 plankton samples, mainly collected during the year 1926.

IV. Plaice.

Estimation of the stock and of the alterations this undergoes was systematically continued by means of regular and numerous measurements and investigations as to age and growth, both at sea and on the fish markets. The agreements arrived at during the meeting of the Committee of the 30th of May and the proposals with regard to the regional allotment of work, as also regarding further investigations and methods to be adopted (comp. Vol. LXVI, 1930, pp. 48—49), have in part already been acted upon in the course of the present year.

1. Statistics and Ichthyometrics. The routine work of measuring plaice on board commercial vessels at sea and also of the various trade categories recognised on the market at Lowestoft and Grimsby has been continued. The marked scarcity of plaice in the Southern North Sea has led to a considerable reduction in the number measured; whereas in previous years hauls of one or more baskets of plaice were common, during the last few months the entries are for a few fish only.

In addition to the work at sea done by the Heligoland Institute, statistical and ichthyometrical work on plaice has been prosecuted on the market at Wesermünde,

[1]) Jean Le Gall. Statistiques biologiques et Considérations sur la population harenguière de la Manche Orientale et du Sud de la Mer du Nord. Matériel 1929. — Revue Travaux Office des Pêches Tome III, Fasc. II, 1930.

[2]) W. Schnakenbeck. Zum Rassenproblem bei den Fischen. — Zeitschrift für wissenschaftliche Biologie, Abt. A (Morph. u. Oekol.), Band 21, Heft 3/4, 1931.

occasionally supplied by measurements at Cuxhaven and Altona. — The numbers of plaice measured in England and in Germany are given in Section B I 1.

2. Age-Determinations. Fishing experiments carried out by the Danish investigators with a 50-foot otter-trawl in the Horns Reef area in the last half of October showed the mean number of plaice of various age-groups and size groups caught per hour in the different depth-zones to be as follows:—

Depth Zone m.	Number of Stat.	Age-groups and Year-class							Total	< 18 cm.		18—25 cm.		> 25 cm.	
		0 1930	I 1929	II 1928	III 1927	IV 1926	V 1925	?		Number	%	Number	%	Number	%
10—20...	6	8	96	136	24	4	6	4	278	238	86	32	11	8	3
20—30...	5	0	40	286	64	18	14	4	426	292	69	102	23	32	8
30—40...	4	0	10	236	92	10	6	6	360	156	44	174	48	30	8

It appears from the table that the 1928 year class must be regarded as a rich one. — In the western part of the Limfjord (Nissum Broad) experiments with a fine-meshed trawl (Eel-tog) were carried out in May and August. The abundance of the different year classes can be put down as follows (5,932 plaice caught and investigated):—

Year class 1927 normal
— — 1928 rich
— — 1929 below normal.

The 1928 year class is thus found to be rich on the nursery grounds of the Horns Reef area as well as on those of the western Limfjord.

Two cruises of the "George Bligh" were devoted to the capture of plaice in order to collect otoliths for growth rate calculations and the study of fluctuations in abundance of the various brood years. Marking experiments were also carried out on these voyages. The line of stations from the Leman Ground to the Haaks Light Vessel was trawled in May and November; the entire catches of 1,459 and 1,149 plaice respectively were measured and otolithed.

Samples were also taken near the Haaks Light Vessel and on the Schiermonnikoog Ground. The following number of otoliths were obtained.

	May	November
Near Haaks Light Vessel	345	680
Schiermonnikoog Ground.....	1,156	487

The total number of otoliths taken from these cruises was 4,826.

As was foreshadowed in the report for 1929, the 1928 year class (II-group in 1930) proved to be more abundant than the two previous year classes. Both in May and November along the Leman—Haaks line, and the Haaks Light vessel over 60 % were of this year class; the III-group (1927 year class) was the next most abundant year group. In May, however, at Schiermonnikoog 52.9 % were of the III-group, but in November

they had fallen to 26.9 %, and 63.7 % were of the II-group. The 1929 year class was taken in very small numbers.

The work of tracing the effect of fluctuations of the young stock on the landings of plaice on the market at Lowestoft has been continued. The fish were weighed, measured and otolithed. The numbers were as follows:—

1930	Dead Small	Small	Best Small	Small Medium	Best Medium	Large and Best	Total
April	402	696	292	372	286	104	2,152
July	522	496	221	311	423	198	2,171
October	125	688	215	209	295	156	1,688
December	130	314	200	197	144	100	1,085
Total...	1,179	2,194	928	1,089	1,148	558	7,096

The material has not been worked up for October and December, but for the earlier periods it has been completed and related to the catch per 100 hours fishing from the Port.

In April approximately 90 % of the catch by number was divided almost equally between the III, IV and V age groups (1927, 1926 and 1925 year classes). The catch per 100 hours' fishing was 12,470 plaice (47 cwts.). In July the catch per 100 hours' fishing fell to 8,277 plaice (33 cwts.). The decline was due mainly to the decrease in number of the IV and V age groups (by approximately 50 % and 80 % respectively). The II-group (1928 year class) had risen and was more abundant than the II group (1927 year class) of the same month in the previous year.

A comparison with the previous year shows a decline in the numbers caught per 100 hours' fishing in every age group both in April and July with three exceptions. Provisional conclusions from the work of the last two years may be summarized as follows:—

Year class 1925 good
— — 1926 bad off the Danish coast, moderately good off the Dutch coasts.
— — 1927 good
— — 1928 good
— — 1929 probably poor?

It should be mentioned in qualification that while the 1925 and 1928 year classes were good it is unlikely that they will prove so abundant as the year class of 1922.

The present stock of the various age groups does not promise well for the future of the plaice fishery are not promising. An analysis of the amount by weight taken per 100 hours' fishing of each trade category landed at Lowestoft shows a decline in April and July 1930 as compared with the same months in 1929. This is particularly evident in the subcategory "Small". There would, therefore, appear to be no great reserve of stock available to swell the landings of the larger and more valuable fish in the future.

With respect to the results of the German investigations, two further publications have appeared. One of these contains a summary of the data arrived at regarding the

age-determinations in the area off Heligoland and in some of the neighbouring districts[1]), whilst the other brings a report on the results arrived at in the year 1929 in the south eastern North Sea[2]). In addition, the summarized exposition of the phenomena of fluctuation in the case of plaice, which was delivered at the scientific meeting of the Council on the 27th of May, 1930[3]), has been published. — In the year under report the determination of the age composition was continued by Heligoland in the usual manner in the south eastern North Sea, the following samples being taken (in June by the "Poseidon", in the other months by the "Augusta"):—

Month	Territory	Number of otoliths determined
February	Hever section	2,009
March	Otzumer Balje section	1,872
April	— — —	3,670
—	Hever section	325
May	Otzumer Balje section	708
June	10 sections between Borkum and Hanstholm	14,503
July	Heligoland	2,768
September/October	—	1,816
	Total...	27,671

In addition, 5,041 age-determinations were made (mostly from the market categories "IV" and "live") on the Wesermünde Market from the catches of 26 cutters and 2 steamers, and a further 1,696 at Altona and Cuxhaven from 1 steamer and 3 cutter catches. It is proposed to amplify these determinations, which are intended to test the influence on the quantity of fish landed of fluctuations in the stock of plaice and to extend them to other fish markets.

As in May, 1929, and on former cruises of the "Poseidon", in June, 1930, the stock in the south eastern North Sea was investigated on about 10 sections, running perpendicularly to the coastline, catches of one hour's duration being made at several stations on each section at various depths. The area in question was examined at places so numerous and evenly distributed that conclusions may justly be drawn from the average catch per hour for each single age group with regard to the density of the single year classes. An attempt was therefore made to estimate the abundance of a few year classes in this manner. For this purpose not only the frequency of these age groups in each single catch was duly taken into account but also the distance from one another of the stations in one and the same section, and that of the sections themselves from one another. To that end a rough system of interpolation was adopted

[1]) A. Bückmann. Die Ueberwachung der Alterszusammensetzung des Schollenbestandes in der Deutschen Bucht mit besonderer Berücksichtigung des Fluktuationsproblems. — Ber. d. D. W. K., N. F., V, 3, 1930.

[2]) A. Bückmann. Die Alterszusammensetzung des Schollenbestandes der südöstlichen Nordsee im Jahre 1929. — Journ. du Cons., V, 1, 1930.

[3]) A. Bückmann. Die Erforschung der Fluktuationserscheinungen bei der Scholle (*Pleuronectes platessa* L.). — Rapp. & Proc. Verb. LXVIII. 1930.

(straight-line interpolation); nevertheless, it is to be hoped that the values thus determined may prove useful as an approximation. Further observations will be required to decide whether such a method of calculation is sufficiently precise to render the procedure really of service. The respective investigations of 1929 and 1930 admit, to begin with, of the comparison of a certain number of year classes in the area between the Borkum and the Listerdeep sections: from this it would appear, that the 1928 year class was 4 times as numerous as that of 1927, compared in the II-group. Any comparison of the 1928 and 1929 year classes in the I-group is unsafe, since a comparatively wide-meshed net was made use of in the catches; yet 1929 would appear to be far feebler than 1928. In the III-group the 1927 year class was caught twice as often as the 1926 year class in the previous year, which latter as IV-group was taken to only half the quantity of the 1925 year class. Still, the proportion of 1925 to 1926 — 2 to 1 is in all probability too low if the Horns Reef area is also taken into account, for the 1925 year class was particularly abundant in the North.

The 1930 catch of plaice, 5 and more years old, turned out quite disproportionately inferior to that of 1929. This is probably to be attributed on the one hand to the advanced season (emigration of the plaice into the deeper regions), for the determination of the stock by the "Poseidon" took place in May in the cold year of 1929 but not before June in the normal year of 1930. On the other hand, however, it must be referred to the effects of the fishing, since this had begun much earlier in 1930 than in 1929. Up to the commencement of the control cruise of May, 1929, German cutters had landed 150,000 kgs. of plaice from 151 voyages made, and about 1,000,000 kgs. from 981 trips up to that of June, 1930. As was ascertained, just at the commencement of the 1930 season it was principally old plaice that the fishermen had landed, so that at the beginning of the observation cruise their number had been considerably thinned out. Such influence will probably have extended to all the older fish up to and inclusive of about the IV-group, as a consequence of which the frequency of the 1926 as also of the older year classes ascertained in the investigations must be regarded as too slight in comparison with the frequency of the corresponding age groups of the previous year. In conclusion, however, it must be admitted that on the disappearance of the abundant post-war year classes of 1919 to 1922 the number of older plaice in the south eastern North Sea has, generally speaking, rapidly diminished as a result of the fishing.

3) Rate of Growth. This problem is being studied in England in two ways. Firstly by determining the average size of each age group of plaice taken by the "George Bligh", and of the market samples landed at Lowestoft; secondly by means of Marking Experiments. Comparable results of the investigations of 1930 with previous years are given in the table on page 170.

It will be noticed that while there are considerable variations in the average size there is no evidence of any consistent rise or fall. — The data obtained from the estimation of length for age of the market samples are still incomplete.

In the German investigations carried out in the German Bight the mean length of the age groups in June, 1930, proved for the most part somewhat greater than in May, 1929. The II-group, created by the abundant 1928 year class, formed an exception

Average length of certain age groups (Samples of less than 10 fish omitted) taken at Stations off the Dutch Coasts in 1928, 1929 and 1930. Gear: Otter trawl with cod-end covered with shrimp net.

Ground	Month	Year	Depth Fathoms	Age Groups												
				Males							Females					
				I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII
Leman-Haaks	May	1928	19-13	..	17.0	20.2	22.4	25.4	26.2	28.5	..	17.5	21.3	23.6	27.6	28.2	31.6
Line	—	1929	17-13½	..	15.1	20.3	23.0	24.8	26.2	26.5	..	15.4	21.2	23.7	26.1	28.1	30.4
	—	1930	17-12	11.6	14.9	19.8	24.0	..	..	..	11.9	15.4	20.6	26.6	..	..	..
Near Haaks	—	1928	13-14	12.1	16.4	18.9	20.3	..	..	..	..	16.6	20.2	22.2	..	26.4	..
Light Vessel	—	1929	13-14	11.9	15.5	20.0	22.4	..	..	..	11.8	15.3	19.6	23.2	24.5	..	28.6
	—	1930	13-14½	11.3	14.6	19.6	..	..	..	..	12.1	14.8	19.4	..	..	..	..
Schiermon-	June	1928	14-17	18.0	20.8	22.8	24.0	25.4	27.2	..	18.0	21.9	23.5	25.3	27.4	28.8	..
nikoog Ground	May	1929	14-16	11.8	18.3	22.2	24.7	..	..	..	12.0	19.0	22.4	26.4	27.6	..	..
	—	1930	15-16½	..	16.6	22.7	25.3	27.8	..	..	..	17.2	24.1	25.9	..	..	..
Leman-Haaks	Nov.	1929	16½-13	..	18.2	24.2	26.2	27.6	..	..	..	18.4	24.3	27.0	30.2	..	..
Line	—	1930	16-12	16.6	19.3	23.8	27.7	29.7	..	..	16.6	19.8	24.1	28.9	..	..	..
Near Haaks	—	1928	14-16	16.3	18.2	20.0	21.2	..	26.8	..	15.9	18.5	21.5	22.4	..	28.7	..
Light Vessel	—	1929	15-13	15.0	16.7	20.5	..	..	..	..	15.0	16.8	21.1	..	..	..	..
	—	1930	12-16	15.7	17.5	21.8	..	..	..	..	16.1	18.2	22.2	..	..	..	..
Schiermon-	—	1928	14-16	18.7	22.5	25.0	26.0	..	..	..	19.3	22.6	26.2	27.6	..	33.1	..
nikoog Ground	—	1929	14½	13.7	18.7	21.7	..	..	..	..	14.2	19.7	22.1	..	..	..	..
	—	1930	14-15	..	19.4	24.0	..	..	..	..	16.6	19.9	24.5	27.4	..	..	..

in almost every case, so that this class has apparently grown to a less degree than is the case with the progeny of the 1927 year class, which was less abundant, the reason for this probably being the greater competition for food, in all probability mostly in the first year of life. — In 1930 also, the average length of the groups was again greater in the region off Norderney than off the North Frisian coast.

4) Seasonal Distribution of the Stock. Material applicable to this question was afforded by the repeated investigation of the section Otzumerbalje (Spiekeroog)—Heligoland during the spring. The plaice here were found to have moved to deeper waters than was the case in previous years. This held good in particular for the young fish of 2 and 3 years old. As has been observed before, the catches decrease in quantity very rapidly here, in the inner angle of the German Bight, with the advent of the warmer weather.

5) Investigation of younger stages. *Vide* Sect. B. I. 2. The results of the German observations of 1925—1930 with the Johansen net in the shallows (Watten) regarding the fluctuations in the 0- and I-groups fail to exhibit in every case a satisfactory general agreement with the later ascertainments obtained in the open sea referring to the same year classes. This applies above all to the 1926 year class, which seemed particularly abundant in the 0- and I-groups but was recognized as only moderate in

the later age groups. On the other hand, the 1928 year class, which is now particularly numerous even in the open sea, proved abundant near the coast also in the two youngest groups. (The test of a numerical estimate of the relative abundance in the year classes 1925—1928 of the I-group yielded the following proportions: 1.6 : 4 : 1 : 3.8; 1929 was nearly as slight as 1927). Observations carried out in August at the mouth of the Elbe showed that the 1930 year class was caught in comparatively great numbers, even more numerous than the 0-group of the 1928 year class during the same month 2 years earlier, the great frequency of which latter only became manifest later, in the autumn of 1928 and in the ensuing spring. The investigations carried out up to now, which could not be continued subsequent to the month of August, are not adequate, according to experience, to serve as a basis for estimating the abundance of the new year class with any degree of certitude. Apparently the external conditions reigning in the spring of 1930 were particularly favourable to the development of a strong population in the German Bight. In this connection, some observations on the appearance of plaice brood off Heligoland and in the estuaries are of interest. In normal years plaice eggs off Heligoland and to the east of it are scanty; they are more numerous west of Heligoland, particularly in the direction of the true spawning place in the SE. angle of the 40 m. line, where in February—March spawning usually attains its climax. In 1930 the eggs had already appeared towards the end of January off Heligoland, their presence being confirmed at the same period in the estuaries of the Jade and Elbe, increasing rapidly at the beginning of February. Well advanced larvae at the stage of development of the fin rays, which had probably been hatched in the south western North Sea during the month of November or December, were first encountered at the mouth of the Jade on the 24th of January, whilst they were found off Cuxhaven on the 10th of February in the stage when the eyes are shifted, these stages not appearing in normal years before March. At the same period there appeared off Heligoland planktonic forms not otherwise found there at all, or but rarely, one of which is specially typical of the water above the "Deep Water" in the Flemish Bight[1]). The first bottom stages of plaice were caught on the Heligoland Düne earlier than in former years and showed a higher average length. It is quite possible that the above-mentioned features are connected with the abnormally strong influx of water from the Channel into the North Sea during the months of November to January, particularly in January[2]). As far as the young plaice are concerned, however, the warm weather during the first months of 1930 may also have been an influential factor, in so far as this will have quickened their growth and hence their migration. Plaice of the 0-group were bigger by 1 to 2 cm. at the mouth of the Elbe in August than in the previous year, showing a disposition to spread downwards to a degree which is otherwise reached only at the beginning of November.

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[1]) It is here a question of the Tiaride *Turritopsis polycirrha* Kef., one specimen of which had only once been found off Heligoland in 1892 during the whole time of the plankton observations. Several were captured in the vicinity of Heligoland and of the Elbe I lightship between 28. I and 10. II, 1930.

[2]) *Vide* J. N. Carruthers. The Water Movement in the Straits of Dover. Exceptional Currents in Winter 1929—30. — Journ. du Cons. V, 2. 1930.

In the catches with the Johansen trawl along the Dutch coast (mouth of the Haringvliet and off Helder) effected from January to April there were but few young plaice: far more observation stations will therefore be requisite for a thorough investigation.

6) Food of plaice. Already mentioned in Section B. I. 4.

7) Marking Experiments were carried out by the Lowestoft Laboratory in May 1929[1]), May 1930 and November 1930. The results are not yet fully worked up, but the following table gives particulars of the numbers liberated and percentages of recaptures. The returns for 1930 are, however, incomplete[2]).

May 1929	Horns Reef	Graa Dyb	Near Sylt	Schiermonnikoog	Haaks Light Vessel
Number Liberated.....	501	500	508	502	500
% Recaptured after 1 year	56.3	36.3	41.6	40.4	20.2
% Recaptured to Dec. 1930.....	59.1	45.2	43.7	44.6	25.6

May 1930	Schiermonnikoog	Haaks Light Vessel
Number Liberated.....	549	348
% Returned to Dec. 1930	10.7	13.2

In November 1930, 380 and 340 plaice were liberated near Schiermonnikoog and the Haaks Light vessel respectively. Pending the completion of the full report the following figures of the average increase in size are of interest. They deal in all cases with fish retaken in the September after the May liberations, the number of fish retaken are in brackets:—

May 1929 Experiment	Horns Reef (11) 3.4 cms.	Graa Dyb (11) 3.0 cms.	Sylt (10) 3.6 cms.	Schiermonnikoog (26) 4.5 cms.	Haaks Light Vessel (4) 2.0 cms.
May 1930 Experiment			Schiermonnikoog (10) 1.8 cms.	Haaks Light Vessel (4) 1.8 cms.	

The explanation of the much smaller increase of growth from the Schiermonnikoog liberation in 1930 is probably a simple one; possibly the returns in 1930 were mainly of fish that had remained inshore while those retaken in 1929 were captured further afield. The case is cited since it shows the difficulty that is experienced in calculating variations in the average rate of growth; this matter will be dealt with fully in the report on the English plaice investigations now in course of preparation.

8) Races of plaice. —

9) Saving gear. Mentioned above (Section B. I. 6).

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[1]) Mention of these was inadvertently omitted from the English Report for 1929.

[2]) The figures given in this section are subject to revision.

V. Other Fish.

Flounder. In the German investigations, the collection of measurements and of material for age determination was continued.

Gurnards. In Boulogne the investigations on the most important species of Triglidae were further pursued. A publication regarding the average number of vertebrae in some species has been published[1]).

Mackerel. The observations on the concentration of mackerel in the eastern part of the Channel and in the North Sea were continued by the station at Boulogne.

Sardines. Here also, the investigations at Boulogne have been maintained, the same applying to

Sprat. In addition, market specimens of this fish were examined at Lowestoft, as in the previous year. In the Limfjord the spawning places, growth, and racial characteristics of this fish formed the object of study during the spring and in the autumn[2]).

Sole. In the investigations by the Heligoland Station carried out in the German Bight the age composition of the stock was kept under supervision as hitherto. In 1930 the catches were larger than in 1929 (after the cold winter), from which we may conclude that immigration from the West has again taken place. The numerical value of the catch at the trawling stations of the "Poseidon" in the 6 sections in the German Bight within the 30 m.-line amounted in June to 4.3 per hour's catch (May, 1929 = 0.48; May, 1924 = 6.7). There are no signs of a new abundant year class so far.

Further material was also gathered by the laboratories of the various countries regarding other kinds of fish.

VI. Shellfish.

Crab Marking Experiments in England. During July and August, 1930, five hundred soft crabs were labelled and liberated at Sheringham, Norfolk, in the Eastern Sea Fisheries District. The labels used, which bore the letter "E", were numbered 1—3 and 5—501. The number recaptured to date is 28, all being taken at, or very near, the place of liberation. The aim of the work is to gain further information regarding the migration of the crab, and especially to ascertain whether there is a marked tendency to travel along the coast, as well as offshore and onshore.

On behalf of the Ministry of Agriculture and Fisheries experiments on artificial breeding and rearing of oysters in tanks were continued at Conway and Lympstone with most encouraging results. As an essential factor to success the supply of suitable food has been kept in the forefront of the investigations. Heavy spat settlements and large numbers of well growing young oysters have been obtained in the tanks after feeding the larvae with spermatozoids of brown seaweed.

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[1]) E. Priol. Remarques sur la formule vertébrale de quelques Triglides. — Revue des Travaux de l'Office des Pêches, T. III, Fasc. 2, 1930.

[2]) *Vide* A. C. Johansen. On the Sprat (*Clupea sprattus* L.) in the Limfjord. — Rep. of the Danish Biological Station XXXVI, 1930.

Papers have been published on studies on the conditions of fishing for *Pecten maximus* in the coastal area of Boulogne[1]).

The experiments on artifical breeding of oyster fry and lobster fry were continued in the Heligoland laboratory. Interesting results have been gained on the weight and growth of young lobsters subsequent to moulting and on the relation between the growth and colour of the shell and different kind of food. Papers have been published on the observations on the pelagic oyster fry in the North Frisian shallows and on the development of the plankton in culture glasses for oyster fry experiments[2]).

C. Benthos and Deposits.

Studies were continued by the Heligoland Institute in the directions already indicated in the 1928 Report. As before, the greatest stress was laid upon the routine examination of the "Valuation Area" off Borkum-Norderney, which took place in June and August. On the June excursion, 1930, only a very slight influx of population was observed, the two sections near the coast containing the greatest quantity of fish food (8 and 10 gr. per sq.m. respectively), whilst the remaining sections showed only about 4.5 gr. per sq.m. According to the above data scarcely anything remained of the abundant stock of Polychaeta observed in October, 1929 (*Vide* Rapp. & Proc.-Verb. Vol. LXVI, p. 135), which must be regarded as a further indication of the short duration of rich nourishment for bottom fish. In June, 1930, the Echinodermata also were very scarce, whilst *Echinocardium cordatum* was altogether lacking in the "coastal section". On account of the storm from the 12th to the 14th of August, 1930, the second observation of the area brought only incomplete results, yet even these were sufficient to demonstrate the extreme rapidity with which the bottom stock was able to increase during the quiet weeks of June and July through settlement of fry. A heavy brood of *Echinocardium cordatum* may be cited as a particularly remarkable feature. This sea-urchin had almost entirely disappeared in May, 1929, after the cold winter, and had not appeared again even by October of that year. But there must have been a very heavy arrival of brood during the warmth of the early summer of 1930, for in August of that year young specimens (0-group) were found in considerable quantities at many places. Even in this species, however, the well-known patch formation could be verified. In such a case one bottom sample of 0.2 sq.m. extent contained, in addition to 1 adult specimen, 1000 of the 0-group, which on this patch, it is interesting to note, showed a smaller size than was found at the places less densely populated, probably by reason of the

[1]) E. Priol. La coquille Saint Jacques (*Pecten maximus*). Résumé de nos connaissances practiques sur ce mollusque. — Revue Travaux Office des Pêches. T. III, Fasc. 2, 1930.

[2]) A. Hagmeier und A. Schubert. Untersuchungen über die Biologie der Auster. Nr. 4. Die Austernbrut im Wattenmeer. — Wiss. Meeresunters., Abt. Helgoland, XVIII, Nr. 1.

A. Schubert. Mitteilungen über die Entwicklung des Nannoplanktons in Rohkulturen mit stehenden Seewasser. Mit einer Einleitung von A. Hagmeier. — Wiss. Meeresunters., Abt. Helgoland, XVIII, Nr. 2.

competition for food. A further striking feature in August, 1930, is a strong emergence of the *Syndosmya alba*, hitherto found in this area only in isolated instances, now in association with the *Lanice conchilega* (largest number in patches: 92, together with 42 *Lanice*, on 0.1 sq.m.). *Pectinaria* also, otherwise so rare, were numerous too. — In the patches it is in general clearly a question of spots of very limited extent only, so that the capture with the grab must be a matter of chance. Fluctuation in any species can be determined with absolute certainty only where the brood has been exceptionally heavy, as for instance in 1927 with *Mactra* and in 1930 with *Echinocardium*, when in both cases besides the patch formation a general increase in the stock of the area could be established.

In all the trawl catches of the "Poseidon", the epifauna species were determined and numerically checked for the purpose of obtaining further material regarding their biology and oecology, and for the characterization of the fishing grounds. — Several publications on the benthos have appeared[1]). The bottom samples taken from the German Bight have now been fully worked up and an extensive treatise on these prepared by a geologist is in the press.

From the "Explorer" collections with the Petersen Bottom Sampler were made at all stations on both cruises in the area as part of the routine. A paper on the Tunicata of the Scottish Area includes observations in the southern area[2]).

D. Plankton.

Two plankton cruises were made during 1930 from Lowestoft. On the first in June a series of vertical hauls were made with Nansen nets of 60, 40 and 30 threads to one inch in an endeavour to find which of the three nets approximated nearest in its catches of the principal food organisms to the proportions found in the herring stomach contents. From the results obtained it appears that the net made of silk with 40 threads to 1" was the nearest of the three. — The second cruise, in October, was devoted to a search for possible concentrations of *Phaeocystis* or Diatoms which might act as barriers to the migrations of the herring towards the East Anglian fishing ground. The result was negative. A report has been published[3]) on the influence of concentrations of the colonial flagellate *Phaeocystis* on the migrations of the herring. The conclusions reached

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[1]) A. Hagmeier. Eine Fluktuation von *Mactra* (*Spisula*) *subtruncata* da Costa an der ostfriesischen Küste. — Ber. d. D. W. K. V. 3, 1930.

A. Hagmeier. Die Besiedelung des Felsstrandes und der Klippen von Helgoland, Teil I. Der Lebensraum. — Wiss. Meeresunters., Abt. Helgoland, XV, Nr. 18 a, 1930.

K. Meunier. Zur Verbreitung, Formenbildung und Ökologie von *Harmothoë sarsi*. — desgl. XVIII, Nr. 3, 1930.

H. Hertling. Über eine Hedylide von Helgoland und Bemerkungen zur Systematik der Hedyliden. — desgl. XVIII, Nr. 5, 1930.

[2]) Harold Thompson. The Tunicata of the Scottish Area: Families Molgulidae and Pyuridae. — Fishery Board for Scotland, 1930, No. III.

[3]) R. E. Savage. The Influence of *Phaeocystis* on the Migrations of the Herring. — Fish. Invest. Ser. II, Vol. XII, No. 2, 1930.

suggest that *Phaeocystis* does act as a barrier to these migrations and may divert herring away from or towards a fishing ground.

On the part of France, plankton sampling on the herring grounds was continued as usual. The hydrological observations carried out on the Sandettie lightship further afford a continuous series of catches of plankton taken at that hour at which the tidal current in that region attains its maximum rapidity (2 hours before and 3 hours after each high tide). These catches are made simultaneously at the surface and on the bottom with a small fine net.

On the May excursion of the "Poseidon" and on both those of the "Explorer", plankton observations took place at all stations in connection with the catches for fish brood and the hydrographic observations. — Further experiments were carried out off Heligoland with regard to the catching capacity of various vertical nets. In the Heligoland botanical department, the results from experiments with diatoms (*Melosira*) with regard to the external conditions regulating the formation of the auxospores showed that this is promoted by reduction of the salinity and retarded by its increase. A publication on the subject is now being printed (Archiv für Protistenkunde). For the development of Nannoplankton in cultivation vessels, see section B. VI.

E. Hydrography.

Denmark. During the cruise of the "Dana" in the North Sea hydrographical observations of salinity, temperature and amount of oxygen were carried out. 75 surface drift bottles and 75 bottom drift bottles were put out at the south western part of the Dogger Bank and 25 surface drift bottles at the Little Fisher Bank.

England. During the entire year without cessation, drift indicator work has been in train from the two English Lightvessels Varne and Cromer Knoll. An unbroken series of records from the Varne for about four and a half years is now available, and the successive three day records are, as previously, worked up into a form which enables one to know the mean current representative of individual months, seasons, etc. A second report on the water exchange between English Channel and North Sea will possibly be prepared during the year; thereafter the results from the Varne Lightship current measurements will be published (as agreed at the 1930 meeting of the Hydrographical Committee in Copenhagen) in the Bulletin Hydrographique. Sufficient data are to hand from the Cromer Knoll Lightship to render possible the issue of a report upon the water movements in that area also, and it is possible that work will be commenced on the same lines at some other lightvessel — perhaps the Shipwash. Certain records of an exceptional nature from the Varne Lightvessel were the subject of a paper published in the Journal du Conseil[1]). Sundry drift indicator observations have been made from the research vessel "George Bligh" from time to time, and a number of drift bottle experiments launched.

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[1]) J. N. Carruthers. The Water Movements in the Straits of Dover — Exceptional Current in Winter 1929—30. — Journ. du Conseil. Vol. V, No. 2, 1930.

A paper has been published giving an account of drift bottle experiments carried out in the English Channel in the summers of 1927, 1928 and 1929, and an interesting numerical relationship between wind speed up-Channel, and the rate of travel of surface bottles, has been obtained[1]). A repeated experiment on the same lines was made in July 1930.

Surface observations of salinity and temperature have been continued in the North Sea, English Channel and N. Atlantic on the same routes and lightships, and with the same frequency, as hitherto. The list of routes and lightships is given in Rapp. & Proc.-Verb. Vol. LXVI, 1930, p. 136.

Hydrographical work was done on three cruises of the "George Bligh" in May-June, July and October: the first and second cruises form part of a series of investigations concerned with the connection between salinity distribution and water movement; the observations on the last cruise were related to plankton investigations.

In addition, hydrographic cruises in the coastal waters off north-eastern England were carried out under the control of the Dove Marine Laboratory, Cullercoats, (M.Y. "Evadne") during the months of February, April, May, June, July, August and September.

All the data obtained during the above-mentioned cruises have been forwarded to the Bureau in Copenhagen for publication in the Bulletin Hydrographique.

France. The fisheries protection vessels have continued their hydrological observations on the herring grounds in as far as their service permitted. Water samples are taken by the Sandettie lightship regularly every day 2 hours before and 3 hours after each high tide, the temperature being determined.

Germany. A) Routine observations. The observations made near Heligoland, on board the lightships and by steamers on regular routes are on the whole the same as before (*vide* Rapp. & Proc.-Verb. LXVI, 1930, p. 137). To these must be added: to 3) (l. c.) As well as on the lightship "Borkumriff", samples have been collected from the bottom for testing the temperature and the salinity by the lightship "Elbe I" since the 1st of June. To 4) By the Cuxhaven—New York liners 30—40 water samples are taken monthly in the North Sea. To 5) In addition to the current measurements, the time at which the tide turns has been determined regularly on board the light vessels.

The data obtained by the routine observations near Heligoland and by the steamers were despatched to Copenhagen for publication in the Bulletin Hydrographique, whilst those gathered by the lightships will be published, as hitherto, by the Deutsche Seewarte.

B) Special observations. These were made on the two excursions of the "Poseidon" in June and July.

1) From the 1st to the 23rd of June on 63 stations hydrographic work was carried out at different depths, in the German Bight and in the eastern North Sea up to the entrance of the Skagerak, resulting in 501 observations of temperature and salinity,

[1]) J. N. Carruthers. Further Investigations upon the Water Movements in the English Channel. — Drift Bottle Experiments in the Summers of 1927, 1928 and 1929, with critical notes on Drift-bottle Experiments in General. — Journ. Mar. Biol. Assocn. Vol. XVII, No. 1, Sept. 1930.

90 of O_2 and 40 of alkalinity. Moreover, 250 surface observations of temperature and salinity were made on the voyage. In order to supplement these observations, samples were taken once daily from the 1st to the 23rd of June at high and low tide on all the light-ships which otherwise make observations every 3 to 4 days. In addition, the passenger ship "Cobra" regularly took water samples at 4 definite places on her daily passages from Cuxhaven to Heligoland and Sylt. 2) On the voyage to the Fladen Ground region made from the 24th of June to the 15th of July, a number of stations were selected on the outward and homeward passages for supplementing the observations mentioned under 1), altogether, 23 hydrographical stations, with 233 Temp. and Sal., 137 O_2 and 228 p_H observations; further, 154 Temp. and Sal. observations were made during the voyage.

The Fisheries protection vessel "Zieten" regularly took surface samples (Temp. and Sal.) in various parts of the North Sea.

A publication is in preparation respecting the data of the last few years in the German Bight.

Holland. The observations of temperature and salinity were continued on three Lightships and on the steamer-routes Flushing—Harwich, Rotterdam—London, and, since January 1931, Amsterdam—Hull.

Norway. Weekly observations of temperature and salinity were made on the steamer-routes Bergen—Newcastle and Bergen—Rotterdam.

Scotland. Serial temperature and salinity observations were taken at all stations visited. The data are included in the Bulletin Hydrographique. On both cruises into the Southern North Sea (June and October) ten surface drift bottles were liberated at each observation station. Two papers on surface water drift based on earlier drift bottle experiments have been published during the year[1]).

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[1]) John B. Tait. Part I. A Preliminary Report on the Scottish Experiments 1900—1914. — Fishery Board for Scotland, 1930, No. II.

John B, Tait. Part II. Section I. A Cartographical Analysis of the Experiments in 1910. — Fishery Board for Scotland, 1930, No. IV.

TRANSITION AREA

1930.

By

A. C. Johansen.

A report has been published by the Transition Area Committee concerning Plaice Investigations in the Skagerak and Kattegat.

The co-operative work in 1930 concerned mainly the Plaice and the Herring. As regards Plaice the following subjects were investigated:

1) The age composition of the catches.

2) The abundance of the youngest year-class (0-Group).

It was noted that the year-classes 1927 and 1928 constituted the greatest part of the catches from the research vessels, while the year-class 1929 was poor.

The year-class 1930 was rather poor on the coasts of the southern Kattegat and Belt Sea and western Baltic but considerably richer in the northern Kattegat (Fig. 1). In the Oder Bank area and adjacent parts of the Arcona Basin a considerable number of the 0-Gr. occurred in deeper water from ca. 6—40 metres (Fig. 2).

Fishing experiments for Herring fry were carried out with a 2 metres stramin ring-trawl by Denmark, Germany and Sweden in the month of October (Figs. 3 and 4).

In the Jutland Bank area and the southern Skagerak no herring larvae were caught.

The Autumn Herring of the eastern Kattegat. In the eastern Kattegat the catches of larvae seemed to be somewhat below the normal. The largest catches were taken on the Lille Middelgrund and NE. of Anholt.

The Autumn-spawning Belt Herring. The catches in the south-western Kattegat and Great Belt were far below the normal, as in 1929 and 1927. In 1926 and 1928 the catches were much larger.

The Sound Herring. The catches were far below the normal. The largest number of larvae were taken south of Lolland and east of Falster and Möen. The catches in the Arkona Basin and east of Rügen were unusually scanty.

The Autumn Herring in the Hanö Bay. The catches in the Hanö Bay were small.

Denmark.

The vessels used for investigations in 1930 were as follows:—

s.s. "Japetus Steenstrup" from April 1st till October 20th.

s.s. "Dana" part of September and October.

A motor boat in July and August.

Fig. 1. Number of plaice of the 0-group (year-class 1930) taken per fishing unit in the summer and autumn of 1930. The fishing unit used was a 30 minutes' haul with Johansen's young plaice trawl.

Plaice Investigations.

Fishing experiments with a fine meshed otter-trawl ("Tog") were carried out from s.s. "Japetus Steenstrup" in the Skagerak, Kattegat, Limfjord, Belts, Western Baltic and the western parts of the Baltic proper in May—September.

As was the case in previous years, a fairly crowded stock of young fish was found in the north western Kattegat (particularly in the Aalbæk Bay—Hertha's Flak area).

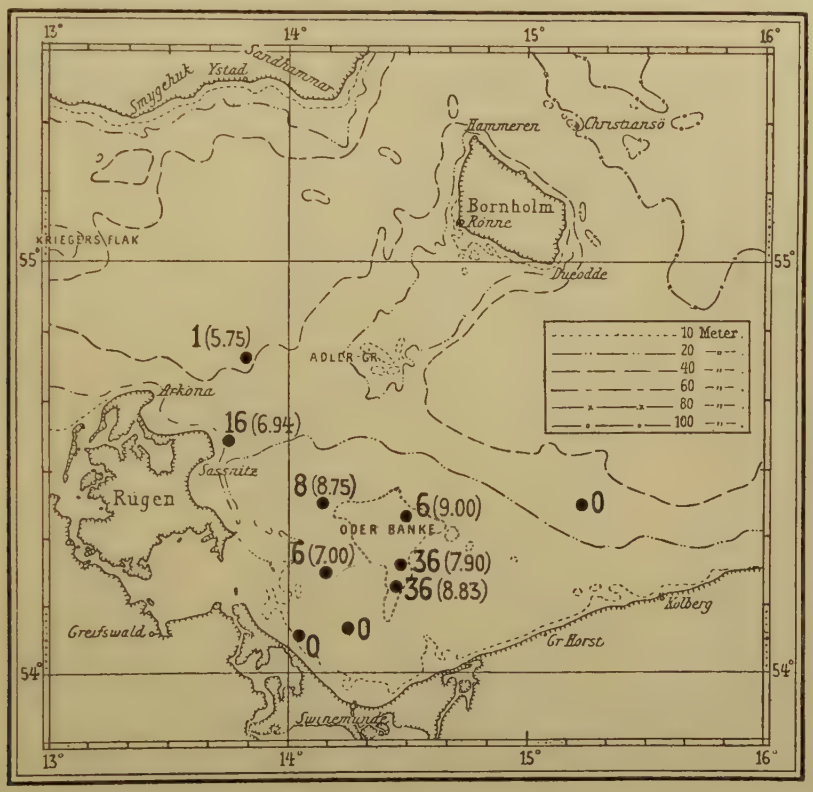

Fig. 2. Number of plaice of the 0-group caught from the "Dana" per 30 minutes' haul with 50 feet otter trawl in the Oder Bank Area in September 1930 (Average length of specimens in cms. in brackets).

A similarly crowded stock was found on investigating the Skagerak between the Skaw and Hirshals (Tannis Bay). The fishing experiments in the Skagerak yielded mainly plaice of group II (year-class 1928) while groups II and III composed the greater portion of the catch in the northwestern Kattegat.

In the Belt Sea and the western parts of the Baltic these two year-classes also predominated in the catches.

Plaice older than group III were found only in extremely small numbers.

Fishing experiments from a motorboat for plaice of the 0-group were carried out on the coasts of the Kattegat, the Belt Sea and the western part of the Baltic proper.

The year-class 1930 was poor on the coasts of the southern Kattegat and Belt Sea, but somewhat richer in the northern Kattegat (Fig. 1).

In September 1930 some fishing experiments with a 50 foot otter-trawl were carried out from the "Dana" in the Oder Bank area and the adjacent part of the Arcona Basin. During these experiments a considerable number of plaice of the 0-group were caught, though most of the individuals had undoubtedly gone through the meshes of the trawl. In Fig. 2 is given the number of individuals of the 0-group caught per $^1/_2$ hour and their average length in cm.[1]). It will be seen that the individuals caught at the greatest depths have the lowest average length. The size and distribution of the individuals would indicate that the rich stock of young plaice in the Oder Bank area do not mainly come from the shallow coastal waters.

The plaice in the Baltic proper has in recent years undergone remarkable changes. It grows more rapidly and is now larger on reaching sexual maturity than it used to be. Also the number of anal fin-rays has increased in a similar manner to those of the plaice in the Belt Sea[2]). The mean figure for the anal fin-rays in the plaice of the Arcona Basin, the Bornholm Deep and the Pommeranian Bay has for the year-classes 1927—1930 been ca. 51.50 which is considerably above the previously observed mean figures.

A counting of the anal fin-rays in the plaice caught in the Oder Bank area, the Arcona Basin and the Bornholm Deep showed the following average figures for the year-classes 1927 to 1930:—

Year-class	Average figure of anal fin-rays	Number of individuals examined
1930	51.92	111
1929	51.20	81
1928	51.75	427
1927	51.10	325

The marking experiments in the Belt Sea in 1929 showed that the average growth of young plaice of 20—25 cm. in length transplanted from the North Sea was 10—11 cm. in the course of a year, while the growth of the local Belt plaice of the same length was only 8—9 cm. The difference in growth is probably due to the fact that many of the Belt plaice of these lengths become mature within a year after marking while almost none of the North Sea plaice become mature within the same period.

Flounder and Dab.

Investigations as to age, length, maturity and food were carried out in 1930 especially in the Kattegat and the Belt Sea.

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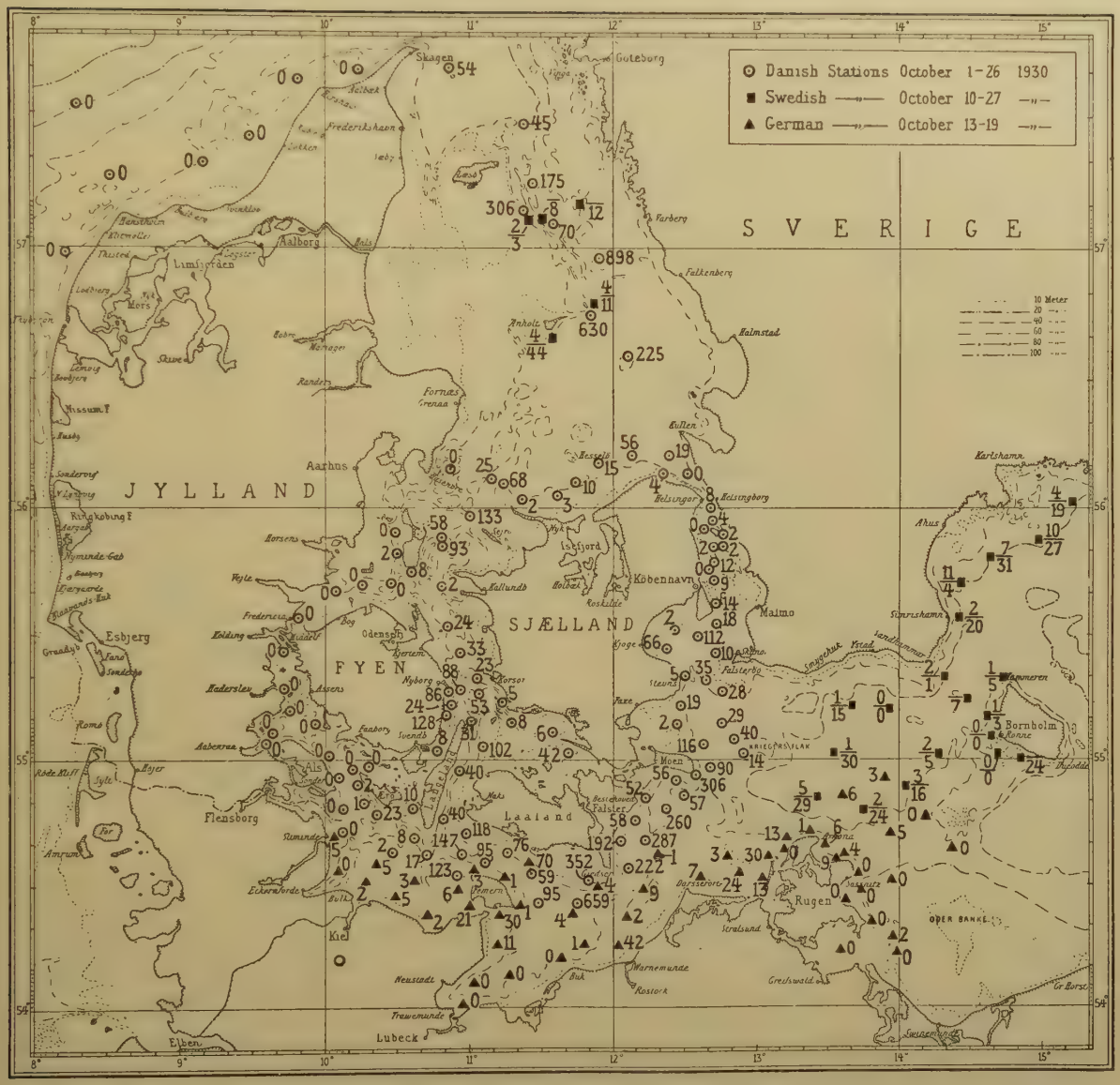
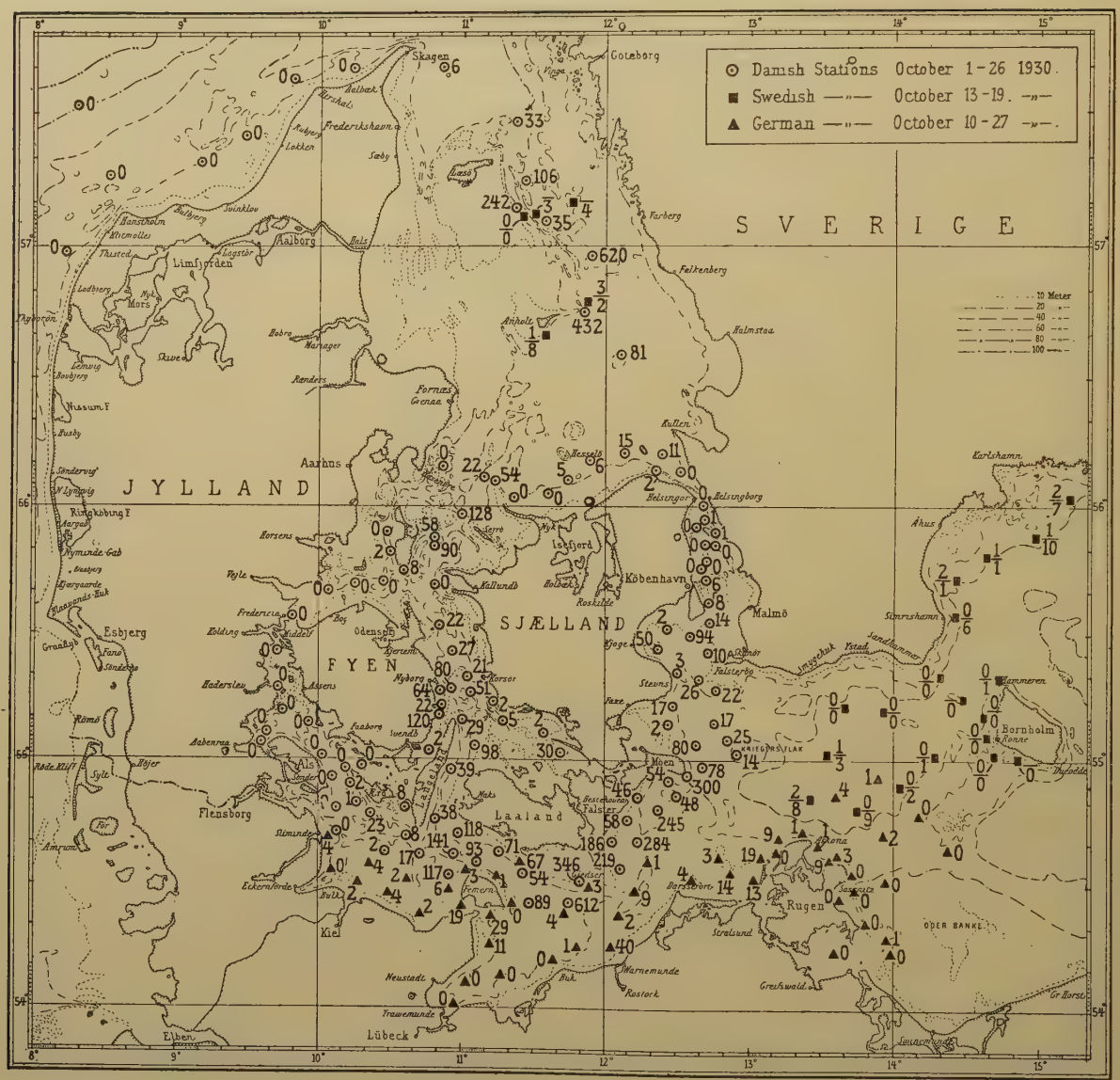
[1]) During the Danish fishing experiments with a Tog in August 1928, 14 plaice of the 0-group were caught at a station N.E. of Rügen at a depth of 24 metres, but only 5 individuals of the same group at 4 stations on the Oder Bank itself at a depth of 9 to 13 metres. The duration of the hauls was 30 minutes, at all stations.

[2]) A. C. Johansen. On some characters of the Baltic Plaice which have changed during the last decennaries. Rapp. & Proc.-Verb. Vol. LIV, 1928.


Danish Stations October 1-26 1930
Swedish —"— October 10-27 —"—
German —"— October 13-19 —"—
SVERIGE
JYLLAND
FYEN
SJÆLLAND
Laaland
Falster
Rugen
Bornholm
Skagen
Göteborg
Aarhus
Esbjerg
Flensburg
Kiel
Lübeck
Malmö
Helsingborg
Helsingör
Falkenberg
Varberg
Halmstad
Karlshamn
Simrishamn
Ystad
Trelleborg
Saßnitz
Stralsund
Greifswald
Warnemünde
Rostock
Neustadt
Travemünde
Elben
Ringkøbing F.
Esbjerg
Fredericia
Kolding
Odense
Nyborg
Korsør
Nakskov
Rudkøbing
Svendborg
Aabenraa
Sønderborg
Gråsten
Hadersley
Tønder
Ribe
Esbjerg
Thisted
Limfjorden
Aalborg
Mors
Skive
Viborg
Randers
Grenaa
Silkeborg
Horsens
Vejle
Fredericia
Kalundborg
Roskilde
Holbæk
Isefjord
Kjøge
Faxe
Stevns
Falsterbo
Moen
Darsserort
Bukt
Kriegsmarine
Oder Bank
Gr Borst
Anholt
Læsø
Hirtshals
Frederikshavn
Aalborg
Thisted
Lemvig
Nissum F.
Ringkøbing F.
Hvide Sande
Esbjerg
Grådyb
Rømø
Sønderho
Tønder
Ribe
Rømø
Aabenraa
Rudkøbing
Svendborg
Nakskov
Korsør
Nyborg
Odense
Kolding
Fredericia
Vejle
Horsens
Aarhus
Grenaa
Randers
Viborg
Silkeborg
Skive
Løgstør
Nibe
Aalborg
Hirtshals
Skagen
Frederikshavn
Læsø
Anholt
Ystad
Trelleborg
Falsterbo
Darsserort
Saßnitz
Stralsund
Greifswald
Gr Borst
Oder Bank
Rügen
Bornholm
Rønne
Hammeren
Simrishamn
Ystad
Karlshamn
Åhus
Helsingborg
Helsingör
Malmö
København
Roskilde
Holbæk
Kalundborg


Damish Stations October 1-26 1930.
Swedish —"— October 13-19. -"-
German —"— October 10-27 -"-.
S V E R I G E
J Y L L A N D
F Y E N
S J Æ L L A N D
Laaland
Skagen
Göteborg
Aalborg
Frederikshavn
Aarhus
Esbjerg
Flensburg
Kiel
Lübeck
Elben
København
Malmö
Helsingör
Helsingborg
Halmstad
Falkenberg
Karlshamn
Ahus
Bornholm
Rönne
Rugen
Stralsund
Greifswald
Warnemünde
Rostock
Neustadt
Travemünde
Limfjorden
Ringkøbing F.
Nissum F.
Ringkøbing
Thisted
Hals
Ålborg
Hirtshals
Skagen
Læsö
Anholt
Fornæs
Grenaa
Randers
Mors
Lemvig
Hvide Sande
Esbjerg
Fanø
Römö
Rømø
Rømø Kirkeby
Rømø Dyb
Sylt
List
Amrum
Föhr
Hörup Haff
Eckernförde
Bulk
Fehmern
Gedser
Darsser Ort
Falsterbo
Stevns
Møen
Faxe
Roskilde
Kallundb.
Holbæk
Nyborg
Korsør
Svendb.
Fåborg
Assens
Aabenraa
Hadersley
Tønder
Ærø
Als
Sønderborg
Nakskov
Kalundborg
Nexø
Kullen
Vinga
Lysekil
Strömstad
Smögen
Marstrand
Varberg
Ängelholm
Landskrona
Ystad
Simrishamn
Trelleborg
Saltholm
Kriegsflak
Drogden
Darsser Ort
Ödm. Grund
Adlergrund
Gilleleje
Hesselø
Anholt
Læsø
Ertholm
Bornholm
Rönne
Christiansö
Ertholmene
Gr. Dornbusch
Gr. Horst
Ruden

Cod.

Experiments with a ring trawl were carried out in April and May in order to investigate the distribution and frequency of the larvae.

Fishing experiments with the Tog to investigate the frequency of the youngest age-groups have been continued. The cod caught with the Tog and otter-trawl were examined as to age, length, sex and food.

Haddock.

Investigations as to age, length, sex and food were carried out for haddocks caught with an otter-trawl from the s.s. "Dana" in the Skagerak.

Herring and Sprat.

Investigations of the herring races in the Transition Area were continued.

The location of spawning places of the herring and sprat by means of fishing experiments for the smallest fry was undertaken in April to July and in October. The distribution of the sprat's eggs and the racial characters of the sprat in the Limfjord were investigated and the following paper published: A. C. Johansen: On the Sprat (*Clupea sprattus* L.) in the Limfjord (Report of the Danish Biological Station XXXVI, 1930).

Experiments in searching for fish shoals from air craft were carried out in July and September with the assistance of the naval air craft. The following paper has been published on the subject: H. Blegvad: Aerial Spotting of Fish Shoals. Danish Experiments in 1930 (Report of the Danish Biological Station XXXVI, 1930).

Mackerel.

A forecast of the yield of the fishery in the northern Kattegat etc. was published by Aage J. C. Jensen in "Dansk Fiskeritidende" for May 28th 1929.

An examination of the interdependence of the hydrographical conditions in the Sound and the yield of the mackerel fishery in that area showed a very marked negative correlation between the temperature of the water in September and the yield of the fishery in that month. (*vide* Aage J. C. Jensen: On the Influence of hydrographical factors upon the Yield of the Mackerel fishery in the Sound (Report of the Danish Biological Station XXXVI, 1930).

Eel.

A forecast as to the yield of the silver eel fishery in Danish Waters was published by Aage J. C. Jensen in "Dansk Fiskeritidende" for August 20th 1930.

Bottom Invertebrates.

Investigations with the Petersen grab of the bottom invertebrates were carried out in the Kattegat, the Limfjord and the Belt Sea in May, August and September.

On the basis of the quantitiative investigations of the bottom invertebrates, H. Bleg-

VAD has calculated the amount of plaice food in the Kattegat with a view to placing it in relation to the size of the plaice population and has published the following paper on the subject: Quantitative Investigations of the Bottom Invertebrates in the Kattegat with special Reference to the Plaice Food (Report of the Danish Biological Station XXXVI, 1930).

Plankton.

As in the previous year quantitative investigations with plankton nets of fine gauze besides vertical hauls with the Hensen net for the capture of fish eggs and larvae were undertaken once a week from three Danish light vessels: Anholt Knob, Schultz's Grund and Halskov Rev.

Also in connection with the ring trawl fishing experiments from s.s. "Japetus Steenstrup" and s.s. "Dana" vertical hauls with the Hensen net were made.

Hydrography.

The hydrographical investigations were undertaken in close connection with the biological investigations. The material collected consists of measurements of temperature, salinity and oxygen content at different depths, made where biological investigations took place.

Investigations were undertaken partly in fjords and partly in the open sea. The latter part of the material will be published in the Bulletin Hydrographique.

The investigations of temperature and salinity from Danish lightships and from stations on the coast were undertaken by the Danish Meteorological Institute as in previous years.

Germany.

Plaice and Flounder (Dr. STRODTMANN).

Dr. KÄNDLER has reported on the alterations in the stock of flounder in the central portion of the Baltic in a short article published in the "Fischerbote", H. 6, 1930. At present the fluctuations, particularly in the stock of plaice, are of great influence as regards the yield of the fishing, now that the accumulated over-aged stock has been used up and fishing is mainly devoted to the exploitation of the younger animals, in which a considerable increase in growth is manifest as compared with former years. Fluctuation in the stock of flounder has proceeded in the same direction as that of plaice, though to a less marked degree. The increase in growth has in like manner led to a greater intensity in fishing for the young stock. In addition, however, the catches are still strengthened by drawing upon a considerable reserve of older fish, so that the poor results of a single year-class are of less account.

Such conditions in the fishing activity necessitated the examination of the young-fish stock. To that end the Oder Bank area, well known as the most important growing grounds for young plaice and flounder in the Baltic, was subjected on two occasions in 1930, at the beginning of June and the middle of October, to investig-

ations by means of small-meshed nets by a fishing cutter specially chartered, with respect to its stock of young fish. The examination took place during the periods of the beginning and the close of the summer flounder fishing, more precise conclusions being given by a comparison of the results obtained on the two excursions regarding the alterations in the fish stock, which are to be attributed to the fishing itself on the one hand and to the immigration and emigration of certain age-groups on the other.

Plaice.

For the first time larger catches of plaice of the 0-group (year-cless 1930) were secured by us east of Rügen, on the north-western slope of the Oder Bank at a depth of 20—21 m. (76 and 261 fish in a catch of 30 minutes with a shrimp trawl with a ground rope of 18 m. length).

On the Oder Bank itself, and between that and the coast, only 9 fish were captured altogether. This fact serves to support the probability of the supposition already expressed by JOHANSEN, that the 0-group of plaice in this part of the Baltic has its main habitat outside the shallow coastal waters. But few individuals of this youngest year-class, that is, only the oldest and consequently largest, migrate further and reach the shallow waters of the Oder Bank and of the coast as early as the beginning of autumn.

The I-group (year-class 1929) was caught only in small numbers in June on the Oder Bank and off the coast, the catch being rather more numerous in October. The distribution plainly showed that this group, too, slowly migrates from the depths towards the shore. On the whole the numbers were so slight as to justify the conclusion that only a poor growth in the 1929 plaice fry is to be expected.

The II-group (year-class 1928) was comparatively frequent. Whilst during the spring it existed principally on the Oder Bank and the shallows off the coast, in the autumn it withdrew to depths up to 20 m. or more. On former cruises also it was always the age-group II, which as the youngest was caught in great numbers in the spring on the Oder-Bank. Hence it is only at the commencement of their third year that the bulk of the shoals of young plaice take possession of the Oder Bank and of the shallow coastal regions.

The older year-classes on the Oder Bank and in the coastal area were lacking altogether. On the other hand, the rich 1927 year-class (group III) was still to be frequently met with in June on the northern and western slopes of the Oder Bank, but by the autumn it had almost entirely disappeared there also. Whilst this diminution is in part due to the fishing, migration into the more saline depths by this year-class, which will become reproductive in the coming winter, also plays a part.

Observations on the frequency of the good year-classes of 1925 and 1927 of plaice in the market catches of the fishermen show that a rich year-class characterizes at present fishing for the space of two years only, namely from autumn in the third year to summer in the fifth, the acme of productive capacity in the case of the plaice being in its fourth year of life (group III). The proportion of the groups of greater age, from V onwards, in the annual results is but slight.

Flounder.

In contrast with plaice, the 0-group (year-class 1930) is to be found everywhere on the Oder Bank and in the vicinity of the coast in the month of October: the closer inshore, the better the catch.

Group I (year-class 1929) also was most frequent along the coast.

During the two cruises, the II-group predominated everywhere. The 1928 year-class of flounder must be regarded as satisfactory, considerably better than that of 1929, though this latter exceeded that of plaice for the same year.

Group III (year-class 1927), which in June was very plentiful, had receded very much in numbers by the autumn, this, as with plaice, being a consequence of the fishing and of migration.

Older age-groups were caught in but small quantities.

The examination of market catches proved that a year-class yields good results for fishing for a period of at least three years, namely from the fourth year of life onwards. In consequence of their lesser growth as compared with the plaice, the proportion of flounder of the II-group in the market catches in autumn is generally speaking unimportant.

A detailed report on these investigations will shortly be published. A short article by Dr. Kändler on the results of the June cruise has already appeared in the "Mitteilungen des Deutschen Seefischerei-Vereins" Heft 10, 1930, under the title of: "Untersuchungen der Jungfischbestände im Gebiet der Oderbank".

Herring (Geheimrat Henking).

The investigations with regard to the distribution and frequency of the larvae of the autumn spawning herrings in the western and southern Baltic were continued. Dr. Altnöder undertook from October 10th—27th a special expedition with a motor cutter, extending from Kiel Bay to the East of Rügen. The 2 metres stramin ring trawl was used for the experiments. The number of larvae caught on the section from Fehmarn to the Pomeranian Bay was far below the normal.

Norway (Mr. Paul Bjerkan).

The stock of sprats in the Oslofjord and the Hvaler area was comparatively low in the season 1930 and the fishing was poor, though considerably better than on the west coast. It is evident, from the samples collected, that the sprat of the year-class 1929 had an average size of between 7 and 8 cm. after the completion of the first summer growth (in January). At the beginning of the fishing in June, in the Hvaler area, it had an average size of about 9.5 cm., while in the inner parts of the Oslofjord it was somewhat smaller. After the first few days of July only desultory catches were made. Samples of fry of the year-class 1930 were received both from the Oslofjord and the south country. According to size the fry fell into two very distinct groups. The smaller group of fry were remarkably small, having in September an average size of about 4.5 cm. The larger species, on the contrary, had, at the same time, an average size of about 7 cm. which is

usual for normal fry in the years when they run large. The large fry seem to be scarcer in the south country than in the waters of the west country where also two size groups were found. The two sizes of fry are obviously the result of an earlier and a later spawning and the relation agrees to a certain extent with previous observations except that the difference in size is more considerable than usual. On counting the vertebrae it appears that the two sizes differ very greatly as to the number of vertebrae. In a sample from Søndeledfjord at Risør an examination showed that fry measuring 3.5—5.5 cm. had an average vertebral figure of 47.73 and fry from 6—8 cm. a vertebral figure of 48.04 while the vertebral figure for each of the groups with a much larger number of individuals may change from 47.35 for 4 cm. to 48.29 for 7 cm. This increase in the vertebral figure from the smaller individuals upwards is indeed a phenomenon which has appeared in all countings of the vertebrae of sprat fry since they were begun in 1927 and up to the present. I have put it down to earlier or later spawning and the consequently different conditions during the hatching.

From the 19th August a cruise round the south country and into the Oslofjord was undertaken by the m/c "Johan Hjort". The particular object of the cruise was to study eel fishing with trawls, but other investigations were also made, for instance, regarding plaice and sprat. In the Hvaler area and the Oslofjord hydrographic stations were taken which showed that the surface layers were considerably warmer than they had been in previous years, for instance, in 1928. No sprat fishing took place in the fjord at this time, but fry of the year occurred in several places and samples of them were taken as before mentioned.

At the State hatcheries at Flødevigen the hatching of cod was continued as usual while the breeding of lobster was suspended. In the late summer and autumn the usual investigations of cod fry in the strand region in the fjords and coastal area were undertaken. These confirmed the observations made during the above mentioned eel trawling experiments, that in 1930 there were very few cod fry to be found.

Sweden.

Biological Investigations (Dr. K. A. Andersson).

In conformity with the programme adopted by the Transition Area Committee the Swedish investigations were focussed mainly on the haddock and herring. The study of the life of the sprat has also been started during the year.

The research vessel "Skagerak" was kept in commission for the greater part of the year and the material for the investigations was mainly collected during the cruises with this vessel. A small motorboat, "Clupea", belonging to the Fisheries Laboratory in Lysekil, was used for short cruises in the inshore waters.

Haddock.

A great deal of work was done studying the age composition of the haddock stock in the Skagerak. The brood of 1928 was abundant in the year under review and

constituted the main part of the catches. The brood of 1929 was much poorer than the year-class of 1928 and the brood of 1930 seems to be very poor indeed. In December 1930, when the 0-group should have been present in the trawl catches, many hauls were made with a fine meshed trawl and only one haddock of the 0-group was caught.

At the fishing harbour of Gothenburg statistical data concerning the different sizes of haddock landed at the harbour were collected throughout the year.

Plaice.

The distribution of 0- and I-groups was studied in the fjords of Bohuslän and along the west and south coast of Sweden in the summer and autumn. The catches of these groups were smaller than during the previous year. Off the coast of Skåne and Blekinge in the southern Baltic the two groups were extremely poor. To the north of Simrishamn on the east coast the 0-group was hardly to be found (Fig. 1 see p. 182).

Flounder.

The stock of this fish was particularly studied in the southern part of the Baltic, specially to ascertain the influence of the fishery upon the stock.

Witch.

The investigations on the spawning areas of the witch were continued. During a cruise in June and July good material was collected for solving this problem. On the whole there is but little spawning of this fish in the Skagerak to the east of Hanstholm lighthouse.

Herring.

A number of samples of herring from the Skagerak and the Kattegat was studied as to races and age composition. The year class of 1924 was still predominant in the catches.

In February a cruise was made in the southern part of the Baltic to investigate the distribution of the herring during the winter.

At many stations in the southern Baltic and in the Kattegat investigations were carried out in October to ascertain the abundance and distribution of young herring larvae (Fig. 3 and 4, see p. 185 and 186).

Sprat.

The study of the sprat was begun during the year under review. Material was collected in order to ascertain the rate of growth and the age composition. The racial characteristics were also studied by counting the total number of vertebrae and of keeled scales etc. During the work there was some doubt as to the use of the keeled scales and the number of vertebrae without the haemal arch as racial characteristics.

During the summer and autumn in the year 1930 a great many sprats of the 1930 year brood occurred in the fjords on the west coast of Sweden. In the different fjords this young sprat showed different sizes. In September the average size of this brood in the fjords was 9.5 cm. The one year old sprat had in June a length of 9.7 cm, in September 10.5 and in November 11.3 cm. In the fjords the two years old sprat was very scarce and its average size in September was 11.6 cm. and in November 12.3 cm.

During the end of November and December an immigration from the open sea into the fjords takes place. This sprat was larger than the fjord sprat. Thus the one year old sprat in the Gullmar fjord at the end of November had an average size of 12.3 cm. and the two years sprat 13.7 cm. At the same time these year-classes caught outside the fjord were of about the same size. A difference in the rate of growth exists between the sprat which has remained in the fjords during the summer and autumn, and the sprat which has been living outside the fjords. The former is smaller than the latter.

An analysis of the total number of vertebrae of different samples shows the following result:

	0-group	I-group	II-group
June 19th, Brofjord	—	47.74	—
November 14th, Färlefjord	47.79	—	—
— 18th, Stigfjord	—	47.76	47.72
— 24th, Vinga, open sea.....	—	47.84	47.90
December, 2nd, Gullmarfjord.....	—	47.96	47.88

An analysis of the age composition shows, that the year-class of 1928 was predominant in the catches outside the fjords and constituted about 62 per cent. thereof. The brood from 1929 constituted only 25 per cent. The poor fishery in the fjords in the autumn 1930 depends very likely upon this fact, as the sprat immigrating from the open sea into the fjords are chiefly one year old fish. This year-class constituted in the Gullmarfjord 73 per cent. of the catches.

Pandalus borealis.

This shrimp is a very valuable food animal in the Skagerak. In September a cruise was made to survey the distribution and abundance of this animal in the Skagerak.

Hydrography (Prof. Otto Pettersson).

The study of the interchange of water between the North Sea and the Baltic was continued, as well as the study of the submarine waves in the Gulmar Fjord.

Hydrographical observations were always carried out in connection with the biological investigations.

The results of the investigations thus carried on have been partly dealt with in the following publications:—

K. A. Andersson: Beståndet av kolja i Kattegat och Skagerak våren 1930 och utsikterna för koljefisket (The stock of haddock in the Kattegat and the Skagerak 1930 and prospects for the haddock fishery). Ny Svensk Fiskeritidskrift 1930 No. 10.

— Räkfisket och dess möjligheter (The fishery on Shrimp, *Pandalus borealis*, and its possibilities). Ibidem No. 20.

Molander, Arvid R.: Vintersillfiske och Hanstholmssill (The Winter Herring Fishery and the Herring off Hanstholmen). Ibidem No. 2.

— Några randanteckningar till sandskäddans biologi i södra Östersjön (Notes on the Biology of the Common Dab in the southern Baltic). Ibidem No. 3.

— Några havsfiskars vandringar och deras betydelse för fisket (The Migrations of some sea fishes and their importance for the fishery). Ibidem No. 11.

Pettersson, O.: Vattenombytet i Gulmarfjorden. Svenska Hydr. Biol. Kommissionens Skrifter N. S. Hydrografi V. 1930.

BALTIC AREA

1930.

By

K. A. Andersson.

During the year 1930 the investigations by the participating countries were concentrated in accordance with the programme adopted in 1930 mainly on the herring, flounder and salmonid fishes. But a great deal of work was also carried out on the sprat, eel, cod, plaice, turbot and dab.

In connection with the fish investigations hydrographic observations were made and material was collected for the study of the ammonia, nitrite, nitrate and phosphate content of the water.

In order to compare the methods of investigation the Polish research vessel "Eva" and the Swedish research vessel "Skagerak" were commissioned to work together in the Bornholm region for a few days in October. On this occasion the studies on the flounder and herring were discussed and such a deliberation during the course of the work seems to be of great value for planning further investigations.

The following is a résumé of the work carried out by the participating countries.

Denmark.

Biology.

Plaice, Flounder and Dab.

The yield of the fishery for plaice, flounder and dab in the Bornholm Deep was satisfactory. The year-classes 1927 and 1928 furnished a very important proportion of the catches of the plaice, whilst the year-class 1929 seemed to be rare on the coasts of Bornholm.

Cod were not taken in great quantities in the Bornholm Deep. During the first months of the year the seals did damage to the fisheries by taking a large number of cod captured on the hooks.

Cod larvae of less than 20 mm. length were taken as late as September in the Bornholm Deep.

During fishing experiments with the stramin ring-trawl on the 19th of September 1930, 6 larvae of the following lengths were taken:—

13 mm.	1
16 —	1
18 —	2
20 —	1
32 —	1
	6

Salmon.

The fishery for salmon in the autumn of 1930 gave a satisfactory yield. Most of the salmon caught were rather small, from 4—6 kg. per specimen, whilst very few had a weight of more than 10 kg. The seals did great damage by eating many of the salmon captured on the hooks.

Hydrography.

Hydrographic investigations were carried out with the "Dana" in the Bornholm Deep in connection with the biological investigations. The investigations comprise determinations of temperatures and salinities at different depths and also of the amount of oxygen. The values are published in the Bulletin Hydrographique.

At the surface at Christiansø, near Bornholm, the Danish Meteorological Institute made daily observations of temperature and salinity. These observations will be published in the annual report of the Institute.

Finland.

Biology.

Material for scale-analysis of salmon from the Kemi, Oulu, Kymi and Kokemäki rivers was collected and marking of young salmon in the Kokemäki river was carried out.

Statistics of the seals killed in the Gulfs of Bothnia and Finland were collected.

Hydrography.

1) Regular observations were made as follows:
   a) Surface temperature daily, surface salinity every 5th day, temperature and salinity at different depths every 10th day at 26 coast stations and 10 lightships.
   b) Surface temperature and salinity by liners from Finland to Denmark.
   c) Currents at three depths three times daily at 10 lightships.
   d) Registration of the sea-level at 14 stations.
   e) Readings of the sea-level at 20 stations.
   f) Records of ice conditions in journals and sketch maps at about 100 stations.
   g) Records of ice conditions in the Baltic by all Finnish ships.
2) A hydrographical cruise was made in July 1930 in the Baltic north of Gotland, during which 72 stations were made. On this cruise samples for the determination of chlorinity, oxygen, alkali reserve, nitrogen compounds (ammonia, nitrate) were collected. In addition, determinations of hydrogen-ion-concentration and phosphate content were made on board.
3) Laboratory work on the carbon dioxide system (quantitative relation between total amount of carbon dioxide, carbonates and bicarbonates, alkalinity and pH) was carried out. Methodical investigations concerning chlorinity analysis and analysis and classification of bottom samples were performed. 93 determinations of alkali reserve, 215 determinations of dissolved oxygen and 12,465 analyses of chlorinity were carried out.

4) Echo-Soundings were made in the eastern part of the Finnish Gulf.
5) A special cruise for current measurements and detailed hydrographical work was made in the Finnish Gulf between Helsingfors and Tallinn during a week in August.

Germany.

In September the investigations concerning the distribution and frequency of larvae of the autumn spawning herring were continued at many stations in the southern Baltic (see the report for the Transition Area).

The market statistics of the flat-fish fisheries for controlling the saving measures in the Baltic have been regularly continued, and in connection herewith continuous investigations have been made into the occurrence of the 0- and I-group of plaice and flounder off the coast.

In the spring of 1930, plaice were transplanted from the North Sea to the western Baltic. The marking experiments then made have shown that a transplantation is feasible, but that its final economic result as compared to the necessary expenditure is problematic.

With regard to the introduction of an international minimum size for turbot relevant investigations were made. These showed that the introduction of such a measure could not be recommended in the Baltic nor, considering the slow growth of this fish, would it be advisable for certain areas of the western Baltic.

As a result of the growing importance of the dab as a commercial fish in the Baltic, investigations into its biology have been made. These consisted chiefly of 3 marking experiments and of numerous age determinations.

In collaboration with the "Deutscher Seefischerei-Verein" Prof. Henking, in the spring of 1930, marked and directly put into the Baltic a great number of young brook trout.

Latvia.

Statistics.

Statistical work was regularly continued by the Board of Fisheries, the number of statistical districts increasing from 72 to 73, the new district being the harbour of Riga, from which fishing in more distant localities has been taken up by a number of motor fishing boats. Detailed data were recorded regarding the motor boats, including the boat, owners' name, tonnage, type of motor and horse power. Also statistics were compiled of the export of fish and fish preserves from Latvia in connection with the Government export control of fish executed by the Board of Fisheries. The data for 1929 are published in the sixth statistical year-book, edited by Mr. V. Miezis: "Bulletin statistique des pêches maritimes de Lettonie — Année 1929". The data for 1930 are being prepared for publication.

Biology.

The Fishery Laboratory of the Ministry of Agriculture introduced in connection with the establishment of the Government Fish Hatchery at Tome on the Daugava

(Düna) extensive experiments in cultivating small Salmonids and Coregonids in artificial ponds. Investigations were also taken up in respect of the development and the abnormalities of Salmonids and Coregonids. Salmon investigations regarding the composition of the year-classes and the spawning conditions were continued and will be published shortly. In May 1930 about 600 salmon, 1 and (a few) 3 years old, were marked and set free in the river Venta (Windau) near Skrunda. Also about 500 flounders were marked in the Baltic Sea near Ventspils (Windau) in November 1930. Investigations of herring and other fish along the Latvian coast were continued at the Fishery Laboratory. Special investigations were made as to the rate of growth and the sex distribution of Eels near the coast of the Baltic at Liepaja (Libau); they will be continued and the results published in 1931.

The work of the Commission for the Investigation of the Pollution of the river Daugava (Düna) by the town of Riga, which Commission was founded by the Municipality of Riga and at which delegates of the Municipality, the University (e.g. the Hydrobiological Station) and the Fishery Laboratory of the Ministry of Agriculture participate, was continued and will be closed shortly.

The Hydrobiological Station of the Latvian University (Director: Prof. Dr. Embrik Strand) began researches in the Gulf of Riga into the distribution of the plankton at different depths and at different hours in order to find the way in which this distribution depends upon the alternations of the temperature of the water, of the salinity, of the currents and of the meteorological conditions. The Hydrobiological Station continued its researches regarding the fish of the waters bordering the Latvian Coast. Mention may be made of the interesting find of mackerel in the Gulf of Riga (Prof. Dr. E. Strand: "Vereinzeltes Vorkommen der Makrele im Rigaschen Meerbusen" (in "Folia Zoologica et Hydrobiologica", Vol. II, Nr. 2 (1931)).

Hydrography.

By the Hydrobiological Station of the Latvian University (Director: Prof. Dr. Embrik Strand) surface observations of the sea regarding t° and S were regularly carried out on the following lines:—

1) Riga—Kiel, observations once monthly at 24 stations.
2) Kiel—Danzig—Riga, observations at 22 stations.
3) Liepaja (Libau)—Riga, observations four times monthly at 11 stations.
4) Ainazi (Haynasch)—Riga, observations nine times monthly at 5 stations.

These observations were published in the "Bulletin Hydrographique".

The observations of water level were continued by the Marine Department of the Ministry of Finance at the stations mentioned in the reports of the previous year. Since 1929 a Mareograph by the firm of Ott, Kempten has been installed at Daugagriva (Dünamünde). In the immediate future the stations at Ainazi (Haynash), and Kolkasrags (Domesnäs) are to be furnished with mareographs, according to the resolutions of the 3rd Hydrological Conference of the Baltic States at Warsowie 1930. The data for water level observations are to be published in the "Bulletin Hydrographique". Topographical measurements of the Latvian coasts combined with measurements of depth of the sea

were continued along the coast from Ainazi (Haynash) to Salacgriva (Salismünde). A chart of the Riga harbour has been published by the Department.

Measurements of the surface temperature at 8 stations along the Latvian coast and of temperature at depths of 0.5, 10, 15 m. at the lightship "Laima" (near Ovizi) were carried out regularly as in former years by the State Meteorological Bureau (Ministry of Agriculture). The results have been published in the "Meteorological Observations". The observations regarding the ice conditions in Latvian Waters were regularly made by the Meteorological Bureau from 11 points along the Latvian coast. Mr. L. Slaucitajs published "Magnetic Measurements in the Baltic Sea along the Latvian coast" (edited by the Hydrographic Section of the Latvian Marine Department).

Various Investigations.

The Fishery Laboratory of the Ministry of Agriculture has been extended by the addition of a special laboratory for chemical and technical investigations. Researches regarding the content of fish, especially of cod and herring and of fish preserves, in iodine, fat and other nutritious ingredients were carried out there. The laboratory has been fitted with modern apparatus for the examination of motor oils, naphta etc. and also for the test of fish nets and of net yarns. Investigations of the pollution of rivers by the cellulose industry and oil refineries are also made by the Fishery Laboratory.

In the Hydrobiological Station of the Latvian University (Director: Prof. Dr. Embrik Strand) investigations were made into the damage caused by Amphipods, especially *Gammarus locusta* L. and *Gammarus Dübeni* Lillj. on fishnets, which they eat. The Hydrobiological Station, in co-operation with the Societies of Fisheries of Latvia, carried out extensive investigations into the preservation of fish nets. The results of these investigations have been published in the "Zwejnieku Wehstnesis" (and as a separate publication distributed by the Hydrobiological Station) and such investigations will be continued.

Poland.

Hydrography.

1) Daily observations of the temperature at 5 different depths at a position near Hel were continued and were begun at another position situated NE. of Hel.
2) The influence of winds upon the temperature of the sea at different depths was studied and the results published in the reports of the 3rd "Hydrological Conference of the Baltic States" in Warszawa 1930.
3) Temperature and salinity were investigated at 12 different points in the Gulf of Danzig forming together a hydrographical profile of this part of the Middle Baltic. This profile was made 8 times in the year in February, May, August and November.
4) Salinity and temperature of the sea water were studied at several points across the Southern Baltic along the line between the Polish Coast and Sweden (Rozywie—Utklippan). 304 water samples were analyzed.
5) Salinity variations in the Gulf of Danzig and their relation to the water masses carried by the Vistula to the Baltic Sea were studied. The results of these investigations

were published in the reports of the 3rd "Hydrological Conference of the Baltic States" (Warszawa 1930).

Sea Fishery.

1) Marking experiments with flounders and common dabs were continued.
2) Studies on flatfishes, on biometrical analysis of their population, on the methods of age-determination and on the young flatfishes were continued.
3) Studies of the races of the herrings and sprats in the Baltic were begun.
4) Studies concerning the relation between the level of the sea and the results of the fishery near the Polish Coast were begun.
5) The influence of different methods of capture of sprats upon the composition of the catches was studied.
6) The first report on the saving trawl was published in the "Journal du Conseil" and a saving trawl was constructed according to principles shown in the report.
7) Technological studies concerning the chemical composition of sprats and flounders were begun.

Salmonid fishes.

1) Marking experiments with Salmon, Sea Trout and Brook Trout were continued. 1720 young marked Salmon and Sea Trout and 168 young Brook Trout were put into the rivers or directly into the sea.
2) Studies on the Sea Trout from the River Reda were finished. The existence of two different biological races was ascertained: one, called "Black Salmon", spawning in the river, and another called "Silver Salmon" not spawning, but only feeding in the river. Morphometrical differences of both races were studied and compared with other races from other Polish rivers. Salmon, taken near Polish territorial waters by means of drift nets and rods were studied mainly for the determination of their age and the rate of growth, in the sea and in the rivers.

Other studies.

Biological features of *Chiridothea entomon* were studied.

Plankton samples for the study of the phyto-plankton were collected at different places near the Polish Coast.

Researches concerning the water pollution in the rivers and lakes were continued.

A new law concerning the regulation of the sea fishery in the Polish waters was introduced. In this law there are special indications concerning the minimum sizes of fish, times and areas closed for fishery and prescriptions concerning the fishing methods.

Statistical figures were collected as in previous years.

Sweden.

As far as possible the investigations were carried out in accordance with the programme adopted.

The research vessels.

Investigations at sea were made by the motorboat "Eystrasalt" and the research vessel "Skagerak". The "Eystrasalt" was kept in continuous commission for investigations in the Baltic from mid-May until the month of November.

With the "Skagerak" two cruises were made to the Baltic in February for investigating the distribution of the Baltic herring during the winter, and in October for investigations mainly on flatfishes.

The investigations in the Baltic were to a great extent carried out by Dr. Chr. Hessle and Dr. A. R. Molander.

Herring.

The investigations regarding the herring were mainly concentrated on the study of the age-composition, the relative abundance of the spring-spawners and the autumn-spawners and the distribution of young larvae. A great number of fishing experiments were made and many samples were collected from different parts of the Swedish coast and examined.

In the previous reports it has been shown that the main stock of autumn spawning herring during recent years belongs to the year-class from 1924. But in 1929 this group was already very much thinned out. This was the case also in 1930 to a still higher degree and no other rich year-class occurred in the catches. The fishing of autumn spawners was therefore as a rule very poor in 1930.

During 1929 the spring spawners formed a great proportion of the catches. This was the case also during 1930. But the good year-class from the spring of 1925 was then rather old and also very much thinned out. No other year-group was rich.

As rich year-classes in both the races were lacking during 1930 the herring fishery along the Swedish coast on the whole was poor.

Dr. Hessle has treated this matter in a paper ready for printing: "Biological statistics regarding the herrings along the Baltic coast of Sweden". In two papers in "Ny Svensk Fiskeritidskrift", No. 8 1930 and No. 3 1931, Dr. Hessle has tried from these investigations to make predictions as to the herring fishery. During the cruise in February to the southern Baltic many hauls were made with a fine meshed trawl, but the catches of herring were always very small. It might also be difficult to find the herring during the winter, as the stock apparently was very weak.

In the Gulf of Bothnia and in the middle part of the Baltic a great number of hauls with a 2-metre ring trawl were made during September and the first part of October in order to ascertain the stock and distribution of young herring larvae, but the catches were always small.

Plaice.

In the October cruise material was collected for continuous studies of the stock of plaice.

Samples from the commercial catches were measured.

Flounder.

The investigations on this fish were continued. Many samples of the young stages were collected at Gotland, in the Kalmar Sound and in the Bornholm area. The catches of the 0-group were rather good.

In the Bornholm region material was collected for continued studies of the influence of the fisheries upon the stock of flounder.

Dr. HESSLE has published a paper: "The young bottom stages of the flounder (*Pleuronectes flesus*) at Fårön and the northern part of Gotland" (Svenska Hydrografisk-Biologiska Kommissionens skrifter, Ny serie, Biologi, Bd. 1, nr. 4).

Turbot.

In September many fishing experiments were made at Gotland and in the Kalmar Sound and in October in the Bornholm area, in order to study the frequency of the young stages of the turbot. The catches of the 0-group were rather good.

Cod.

Fishing experiments were made on the Swedish coast of the Baltic, but the catches of the cod were always very small. The cod stock is at present obviously very poor along this coast.

Salmon and Sea Trout.

The situation of the salmon fishery in shallow water on the south coast of Sweden in the spring of 1930 was very different to that in 1929. In this year small salmon were exceptionally scarce in the catches. Only 7.6 per cent. were smaller than 50 cm. in length. In the year 1930 the contrary happened. 62.8 per cent. of the catches did not reach a total size of 50 cm.

In both the years the sea trout constituted only a minority of the fish caught, in 1929 27.1 per cent. and in 1930 10.4 per cent.

Eel.

Marking experiments were made in order to study the migration of the eel more closely.

Through a study of the catches of the eel in traps (ålbottengarn) on different parts of the Baltic coast of Sweden two interesting and, for the fishery, valuable facts have been found. The eels caught in the traps which were placed further out from the shore in deeper water are without exception larger than in the traps in shallower water nearer the shore. The catches are also greater in deeper water than in shallow water.

It can obviously be concluded that the larger eels migrate into relatively deep water.

Furthermore it has been stated that the eels, on an average, are bigger in the inner parts of the Baltic than on the coast nearer to the Sound.